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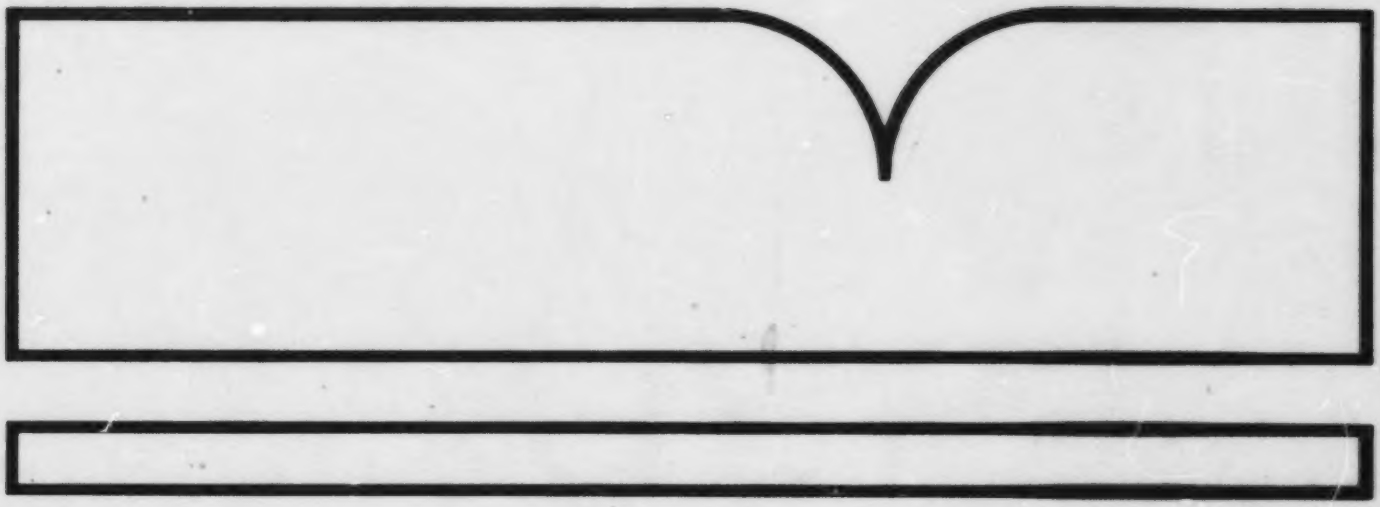
Restorative Maintenance Evaluation of High Mileage, Catalyst-Equipped Vehicles

Automotive Testing Labs., Inc.
Aurora, CO

Prepared for

Environmental Protection Agency
Ann Arbor, MI

7 Nov 79



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Automotive Testing Laboratories, Inc.

Final Report
Contract No. 68-03-2413
Task No. 13

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Work Effort No. 6

Restorative Maintenance Evaluation of High Mileage, Catalyst-Equipped Vehicles

for the

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
Ann Arbor, Michigan 48105

November 7, 1979

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TABLE OF CONTENTS

		Page
ABSTRACT		iii
1.	INTRODUCTION	1-1
2.	TECHNICAL DISCUSSION	2-1
2.1	PROGRAM OBJECTIVES	2-1
2.2	PROGRAM DESIGN	2-1
2.3	TEST VEHICLE PROCUREMENT	2-4
2.3.1	Test Vehicle Procurement Plan	2-4
2.3.2	Incentives for Owner Participation	2-4
2.3.3	Test Vehicle Selection and Screening Criteria	2-5
2.3.4	Test Vehicle Preconditioning Procedure	2-6
2.4	HIGH MILEAGE RESTORATIVE MAINTENANCE TEST PLAN	2-6
2.5	VEHICLE TEST FACILITY AND EQUIPMENT	2-11
2.6	LABORATORY TEST PROCEDURES	2-11
2.6.1	Test Vehicle Preparation Procedures	2-12
2.6.2	Vehicle Preconditioning Procedure	2-13
2.6.3	Federal Test Procedure (Mass Emission Test)	2-14
2.6.4	Highway Fuel Economy Test Procedure	2-15
2.6.5	Federal Short Cycle Test	2-15
2.6.6	Two Speed Idle Test	2-16
2.6.7	Federal 3-Mode Test	2-17
2.6.8	After Test Procedure	2-17
2.6.9	Maladjustment and Disablement Inspection	2-17
2.6.10	Emission Component Function Check	2-18
2.6.11	Emission Control Component Repair	2-18
2.6.12	Determination of Failure	2-19

2.6.13 Catalyst Bypass Fabrication Procedures 2-20

2.6.14 Test Vehicle Depreparation 2-20

2.7 DATA PROCESSING PROCEDURES 2-21

2.7.1 Data Collection 2-21

2.7.2 Data Review and Editing 2-22

2.7.3 Calculation of Test Results 2-23

2.7.3.1 Federal Test Procedure Emission Data 2-23

2.7.3.2 Highway Fuel Economy Test 2-23

2.7.3.3 Federal Short Cycle 2-23

2.7.3.4 Two Speed Idle Test 2-23

2.7.3.5 Federal 3-Mode Test 2-23

3. RESULTS 3-1

4. APPENDICES 4-1

Appendix A - Listing of Vehicles and Test Parameters A-i

Appendix B - Listing of Test Vehicles Usage Data B-i

Appendix C - Listing of Test Vehicle Maintenance C-i

Appendix D - Listing of Vehicle Maintenance History D-i

Appendix E - Listing of Federal Test Procedure Results on Individual Vehicles E-i

Appendix F - Listing of Highway Fuel Economy and Emission Results on Individual Vehicles F-i

Appendix G - Listing of Federal Short Cycle Emission Results on Individual Vehicles G-i

Appendix H - Listing of Two Speed Idle Emission Results on Individual Vehicles H-i

Appendix I - Listing of Federal Three Mode Emission Results on Individual Vehicles I-i

Appendix J - Listing of Vehicle Driveability Evaluations J-i

Appendix K - Listing of Tire Inspection Information on Individual Vehicles K-i

Appendix L - Listing of Comparative Mileage Data on Individuals Vehicles L-i

Appendix M - Listing of Disablement/Maladjustment Occurances M-i

Appendix N - Listing of Emission Component Function Check - Chrysler N-i

Appendix O - Listing of Idle Inspection and Adjustments - Chrysler O-i

Appendix P - Listing of One Year or 15,000 Mile Required Maintenance - Chrysler P-i

Appendix Q - Summary of Vehicle Restorative Maintenance Costs on Individual Vehicles Q-i

LIST OF FIGURES

1. Vehicle Flow Diagram 2-8

LIST OF TABLES

1. Summary of Test Vehicle Sample 2-2
2. Chrysler Federal Test Procedure Results - Summary 3-2
3. Ford Federal Test Procedure Results - Summary 3-3
4. General Motors Federal Test Procedures Results - Summary 3-4
5. Federal Test Procedure - Summary 3-5
6. Per Cent Decrease From As Received 3-5

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) is charged under the provisions of the Clean Air Act with responsibility for the control and prevention of air pollution. In order to fulfill these responsibilities the EPA designs, conducts and promotes surveys and studies of air pollution sources.

National programs to characterize and reduce air pollution from mobile sources are developed and implemented through the EPA's Emission Control Technology Division (ECTD). Mobile emission control strategies developed by the ECTD are based, in part, on projections of nationwide motor vehicle emissions. These projections are derived from surveys designed to obtain emission data from representative samples of in-use vehicles.

A significant portion of the current urban pollution is contributed by those vehicles with accumulated mileage in excess of 75,000. These vehicles are known to have emission levels far in excess of others in the national vehicle population as a result of a combination of factors including worn engine parts and certain maintenance practices (e.g. richer idle settings) commonly followed for high mileage vehicles.

Corrective actions, such as readjusting basic engine parameters or connecting unattached hoses, lines and wires, can cause a sharp decrease in exhaust emissions at a relatively low cost. Other maintenance requiring replacement or repair of defective parts may result in similar exhaust emission decreases but at a higher cost.

During the past several years, the EPA has conducted a series of restorative maintenance programs designed to ascertain the emission related benefits of various corrective maintenance actions. Information derived from these projects is expected to be used as a guideline for developing a cost efficient approach to vehicle inspection programs now under consideration by various states.

In July of 1978, Automotive Environmental Systems, Inc. (AESI) subcontracted with Automotive Testing Laboratories, Inc. (ATL) to perform a restorative maintenance program for the EPA in the St. Louis metropolitan area. In addition to this work, the EPA authorized an expansion of the work effort to include an evaluation of catalytic converter performance on each of the nine vehicles selected for the restorative maintenance project. This additional work was performed as part of an existing contract between the EPA and ATL.

The following report details the design and conduct of the project and presents relevant data.

2. TECHNICAL DISCUSSION

2.1 PROGRAM OBJECTIVES

This work effort was performed to provide quantitative data on the emission-related benefits of restorative maintenance performed on high mileage vehicles. The program consisted of a series of exhaust emission and fuel economy tests performed on nine vehicles both before and after each segment of an inspection and maintenance procedure.

Inspection and maintenance actions were designed to provide a systematic means of identifying and correcting emission control system failures. Exhaust emission and fuel economy tests were performed to gauge the relative decrease in emissions resulting from maintenance actions. Catalyst efficiency was also evaluated by comparing emission test results obtained while the converter remained intact with those obtained using a catalyst bypass and those measured after a new catalyst had been installed.

2.2. PROGRAM DESIGN

Testing was performed on a sample of nine catalyst-equipped, 1975 through 1977 model year vehicles randomly selected from a list of potential test vehicle owners in the St. Louis metropolitan area. Each of these vehicles had been driven a minimum of 75,000 miles.

Upon arrival at the laboratory, candidate test vehicles were physically examined to screen those which had been extensively modified or were unsafe to operate. Once accepted into the program, the vehicles were prepared for testing and following a brief driveability evaluation, placed in soak for a period between 12 and 24 hours.

TABLE 1

Summary of Test Vehicle Sample

Veh. No.	Make	Model	Yr	Odom	CID	Cyl
511	Plymouth	Duster	75	138,831	225	6
512	Dodge	Charger	75	75,064	360	8
513	Plymouth	Sta. Wagon	75	71,026	318	8
524	Mercury	Monarch	75	103,977	250	6
525	Ford	Custom	75	108,238	400	8
526	Ford	LTD	75	111,512	351	8
537	Chevrolet	Nova	75	89,691	260	6
538	Chevrolet	Malibu	75	107,979	350	8
539	Buick	Sta. Wagon	75	137,751	350	8

After soaking, a series of tests were conducted to establish the as-received level of emissions for each vehicle. This test sequence was repeated without modifications at various designated intervals in the program and is comprised of a driveability evaluation, a 12 to 24 hour soak, a Federal Test Procedure, a Highway Fuel Economy Test, a Federal Short Cycle Test, a Two Speed Idle Test and a Federal 3-Mode Test.

A Maladjustment and Disablement Inspection was performed after the initial as-received tests. During this examination each vehicle was inspected for modifications to the emission control system and maladjustments to basic engine parameters. Parts and systems found to be deficient due to normal wear or production faults were termed "defective" and noted for later corrective action. Purposely disabled or maladjusted components were identified and repaired at this time. Those vehicles that received maintenance or adjustments during the inspection were subjected to another sequence of tests before progressing to the next segment of the work effort.

Following the inspection and any subsequent tests, the entire sample received an Emission Component Function Check. During this examination, the performance of each component within the emission control system was evaluated according to procedures specified by the manufacturer. Those components found to be malfunctioning were corrected immediately following the inspection as were defective parts identified during the Maladjustment and Disablement Inspection. In several cases, these repairs were performed with the assistance and guidance of the appropriate manufacturer's representative. When necessary, replacements were made with parts designated as original equipment by the manufacturer. An additional test sequence was performed after the repair procedure to establish the cumulative effects of corrective maintenacne.

Upon completion of the after-maintenance test sequence, catalytic converters were removed from each vehicle and replaced with a bypass unit. These units were constructed with baffles to simulate the average backpressure created by a catalyst. A sequence of tests was then performed. Following these tests, a new catalyst

was installed and after 50 miles of conditioning on city streets, a final test sequence was conducted.

2.3 TEST VEHICLE PROCUREMENT

2.3.1 Test Vehicle Procurement Plan

The nine vehicles selected for this work effort were procured from the St. Louis metropolitan area using random sampling techniques and certain vehicle selection criteria supplied by the EPA. Vehicles eligible for testing were limited to those 1975 through 1977 model-year passenger cars with accumulated mileage in excess of 75,000. Each was operated regularly within 15.5 miles of the St. Louis city limits. Specifications for test vehicle regarding model year, make, engine displacement, body size, transmission type and number of carburetor venturis were supplied by the EPA Project Officer.

Candidate vehicles were identified and acquired primarily through the use of mailing lists. These lists were purchased from a company with specialized vehicle/owner records and statistical data. Potential sources were limited to those with required model-year vehicles living within specified zip code areas.

Owners of eligible vehicles were contacted by mail and asked to complete and return a post-paid information reply card approved by the Office of Management and Budget. Each reply card was attached to an EPA-approved introductory letter explaining in a general manner the nature of emission tests to be performed and the benefits available to participating owners. However, St. Louis Restorative Maintenance vehicles were acquired and tested concurrently with FY77 Emission Factors Program testing. Because they represented only a fraction of the total vehicles tested in St. Louis, introductory letters only addressed Emission Factors Program testing. A more complete explanation was given to the owners at a later point in the test vehicle selection process.

2.3.2 Incentives for Owner Participation

The following incentives were provided to owners of test vehicles to

encourage participation in the program:

A. A $50.00 U.S. Savings Bond

B. Return of the owner's vehicle with a full tank of fuel

C. Use of a late model, fully insured loan vehicle while testing was being conducted

2.3.3 Test Vehicle Selection and Screening Criteria

Those vehicle owners that returned information reply cards were contacted by telephone after a preliminary comparison between the EPA's vehicle list and reported information. At this time, the vehicle owner was informed of the tests that would be performed in connection with the Restorative Maintenance Program. Each owner was questioned regarding the nature of recent maintenance and the extent of any driveline modifications. Owners were also asked for permission to perform a major tune-up and told that vehicles selected for the program would be returned in a condition that would allow them to pass federal emissions standards. If the owner remained willing, the vehicle was scheduled for delivery to the laboratory for a physical inspection and screening procedure.

Prospective test vehicles were given a thorough examination for test suitability upon their arrival at the laboratory. Oil and transmission fluid levels were checked, vehicle exhaust systems evaluated and tires were inspected for unusual wear. A sample of fuel was drawn and tested. Previously acquired information was rechecked. A brief emission control inspection was also performed to screen those vehicles that had undergone misadjustments or modifications which were not readily or inexpensively restorable.

Vehicle owners were asked to complete a questionnaire while the pretest inspection was being performed. This four page form consisted of 38 questions designed to detail the history of the vehicle including the extent of use and the nature of recent maintenance.

Test vehicles were accepted or rejected on the basis of the inspection and

questionnaire results. ATL normally determined a vehicle's qualifications for the program although more complex decisions were made jointly with the EPA. Table 1 on Page 2-2 summarizes the test vehicle sample according to make, model year, odometer reading, engine displacement and number of cylinders. As shown in the table, GM, Ford and Chrysler are equally represented with 3 vehicles each.

2.3.4 Test Vehicle Preconditioning Procedure

Following acceptance into the program, the test vehicles' fuel tanks were drained and one-pint samples were made available for possible analysis by the appropriate manufacturer's representative and the EPA. Each vehicle's tank was then refilled to 40% capacity with Indolene test fuel. Tires were also rearranged to prevent the use of badly worn or snow tires on the dynamometer.

The canister system on each test vehicle was preconditioned to assure uniform test conditions throughout the work effort. A "slave" canister was installed on all six Chrysler and GM vehicles. This was accomplished by disconnecting (at the canister end) the outlet hose extending from the vehicle canister to the air filter unit and reconnecting it to the slave canister. Because of the configuration of Ford canister systems, a different preconditioning procedure was required for these vehicles. Canister systems on Ford cars were disconnected at the air filtering unit end of the outlet hose. Both the canister outlet hose and the air filter hose opening were then taped. No slave canisters were installed on these vehicles.

Vehicle performance characteristics were evaluated during a 10-minute driveability evaluation performed immediately after test preparation procedures. This brief evaluation was used to purge remaining as-received gasoline in the vehicle's fuel system and to prepare test personnel for any operating problems which might affect subsequent tests on the dynamometer.

2.4 HIGH MILEAGE RESTORATIVE MAINTENANCE TEST PLAN

High mileage restorative maintenance vehicles were eligible to receive a

maximum of five test sequences; one to establish as-received emission levels, one or two sequences associated with inspection and maintenance procedures, and two performed in connection with catalyst evaluations.

Testing was conducted according to the vehicle flow diagram on the following page. Specific actions are designed in the chart by rectangles while diamond shaped figures represent decision points in the testing sequence.

Each test sequence performed during the work effort was comprised of the same series of tests: a Federal Test Procedure (without evaporative emission tests), a Highway Fuel Economy Test, the Federal Short Cycle Test, the Two Speed Idle Test and the Federal 3-Mode Test. Prior to each sequence, vehicles were refilled to 40% capacity with Indolene fuel, given a 10-minute driveability evaluation and soaked for a 12 to 24 hour period.

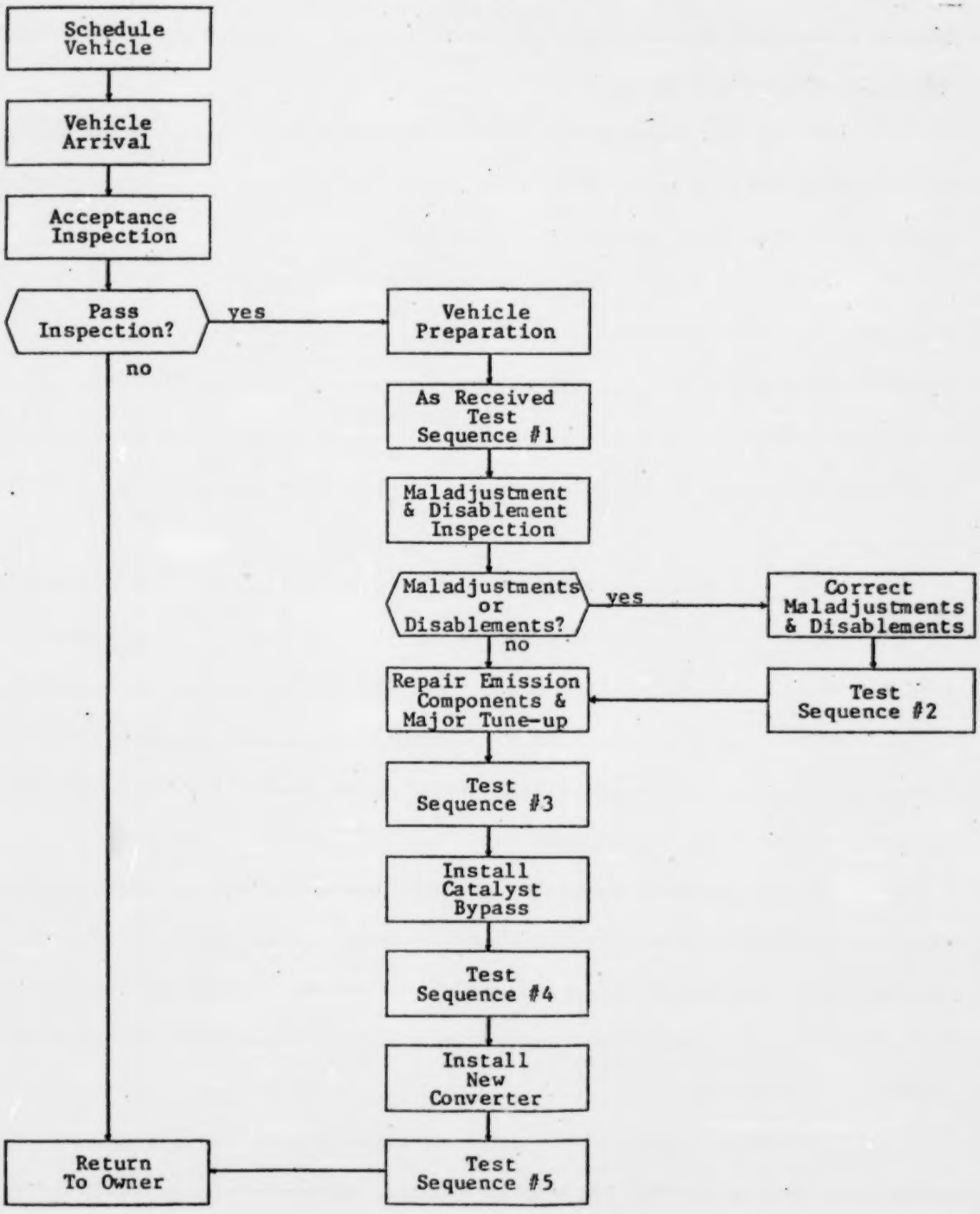
Test sequences were followed by a procedural review designed to assure that exhaust emission tests had been performed as prescribed by the EPA. This review included an examination of dynamometer settings (inertia weight and horsepower), temperature readings and driver's trace tolerances. Other test parameters were also reviewed for mechanical or operational errors. If any problems were discovered the vehicle was resoaked and tested again.

If no immediate errors were identified during the test validation procedure, after test measurements were performed and the vehicle was prepared for the next day's testing. After test measurements were performed and the vehicle's basic engine status relative to manufacturer's recommended settings for idle CO and HC, timing, dwell (if applicable) and idle rpm.

Following screening and preparation procedures, all vehicles received a sequence of tests to establish the level of emissions produced by each vehicle in its as-received condition.

An inspection for engine maladjustments and disablements was performed

VEHICLE FLOW DIAGRAM



after the as-received tests. This examination was conducted to identify vehicle engine parameters and components that were malfunctioning as a result of misadjustments or intentional disabling actions, particularly to the emission control system. Procedures and specifications for the inspection were conducted as delineated in the appropriate service manual or as specified by the manufacturer's representative. Engine settings (e.g. timing, choke, idle rpm and CO) that were found to be misadjusted were corrected at this time. Disabled vehicle components such as disconnected hoses, lines and wires or loose fittings were also repaired.

Engine components that were identified during the inspection as faulty due to deterioration or as a result of production defects, were not corrected at this time but were termed "defective" and noted for later repairs. However, defective emission control components which would affect proper engine settings (e.g. idle stop solenoid) were corrected.

Vehicles that received corrective maintenance during the inspection were subjected to another sequence of tests. Chrysler and Ford vehicles found to have no alterations or maladjustments, including idle rpm and CO settings, did not receive the after adjustment test sequence. Because the idle rpm and CO inspection procedures for General Motors vehicles require certain engine adjustments, each of these cars received a test sequence after the inspection, regardless of their as-received condition.

Each vehicle received an emission component function check after the Maladjustment and Disablement Inspection and any subsequent tests. During this inspection, the operational efficiency of each separate component in the emission control system was functionally evaluated according to procedures specified in the appropriate service manual. A manufacturer's representative was also utilized in some cases to assist in this inspection procedure. Problem areas were identified and noted on an Emission Component Function Check Sheet for later repair.

Upon completion of both the Emission Component Function Check and the Maladjustment and Disablement Inspection, all defective engine parameters and

malfunctioning emission control components were repaired. Each maintenance action was performed according to shop manual procedures with the approval and guidance of a manufacturer's representative. A full sequence of tests was performed immediately following repairs to provide data on the emission related effectiveness of the maintenance actions. FTP emission results were calculated as soon as possible for review by the manufacturer's representative and the EPA. In most cases the test vehicle passed or nearly passed the FTP. In those cases where emissions remained substantially above federal standards, further action was required. Additional work on these vehicles was determined jointly by the manufacturer's representative and the EPA. Any such additional action was followed by a retest of the vehicle.

Following testing and the resolution of any subsequent problems, each vehicle's catalyst was removed and replaced with a bypass unit equipped with a baffle large enough to simulate normal catalyst back pressure. Since exhaust system pressures vary from car to car, a separate bypass and baffle unit was constructed for each vehicle. A full test sequence was then performed. After completing this sequence the bypass unit was removed and a new catalyst was installed. New catalysts were preconditioned with a minimum of 50 miles of driving before the test vehicles received a final test sequence. Vehicles were returned to their owners upon completion of tests with a full tank of gas.

2.5 VEHICLE TEST FACILITY AND EQUIPMENT

The ATL test facility and associated equipment used for this work effort are located at 10862 Metro Court, Maryland Heights, Missouri. This is a permanent facility located just outside the St. Louis city limits.

This work effort was performed under a pre-existing contract to provide additional testing capabilities for the Environmental Protection Agency. As a result, facility and equipment check-in procedures were performed at the beginning of the contract in 1977 and periodically rechecked by representatives of the EPA.

2.6 LABORATORY TEST PROCEDURES

Each vehicle received a prescribed sequence of test and inspection procedures during the course of the work effort. These procedures and others associated with the conduct of the program include the following:

Vehicle Preparation

Vehicle Preconditioning

Federal Test Procedure

Highway Fuel Economy Test

Federal Short Cycle

Two Speed Idle Test

Federal 3-Mode Test

After Test Procedure

Maladjustment and Disablement Inspection

Emission Component Function Check

Emission Component Repair

Determination of Failure

Catalyst Bypass Fabrication Procedures

Test Vehicle Depreparation

Details on these tests and procedures are presented in the following sections.

2.6.1 Test Vehicle Preparation Procedures

All nine vehicles selected for testing received a uniform series of preparation procedures to maintain standard testing conditions and to avoid possible vehicle malfunctions. Transmission and oil fluid levels were checked and filled if found to be low. Radiators and exhaust systems were also examined for leaks prior to final acceptance into the program. A fuel lead test was performed to establish the amount of lead in the as-received fuel and to provide additional data when evaluating catalyst efficiency.

Test procedures were performed in the laboratory at a location

separate from the soak and emission test areas. Upon acceptance into the program, as-received fuel was drained from the test vehicle's tank through a pump system connected to the tank filler neck or the supply line to the engine. During draining operations, two one-pint samples were collected and made available for analysis by the EPA and the vehicle manufacturer. The tank was then refilled to 40% capacity with Indolene clear fuel.

Snow tires and tires found to be severely worn were rotated to prevent their use on the drivewheels. If the front and rear tires could not be exhanged, suitable substitutes were acquired. Tire pressure on the drivewheels was also adjusted to 35 psi for all test vehicles.

2.6.2 Vehicle Preconditioning Procedure

Test preconditioning for each vehicle included adjustments to the canister system and a brief, 10-minute driveability evaluation. Residual fuel in vehicle canister systems can affect fuel economy and exhaust emission tests as ungauged quantities of gasoline are injected from the canister into the vehicle engine. To avoid such masking effects, the canister systems on all test vehicles were either disconnected or rerouted through a prepurged "slave" canister containing little or no fuel. The configuration of emission control systems in Chrysler and General Motors vehicles required the installation of slave canisters to assure optimum test results while canisters on Ford vehicles were more accurately controlled by disconnecting the systems entirely.

An EPA driveability evaluation was performed prior to each soak period. This evaluation was conducted to purge remaining as-received gasoline in the fuel system and to provide test personnel with adequate advance knowledge of vehicle operating characteristics. The driveability test consisted of a five point rating (excellent, good, fair, poor, fail) for vehicle performance during three operating phases: constant speed, acceleration from idle and restart after shut-down. Each of the five ratings used during the evaluation are defined as follows:

Excellent - indicating no trace of undesireable elements (smooth, even responsive).

Good - indicating a slight trace of an undesireable element (initial unevenness, roughness, hesitation, quickly overcome).

Fair - indicating an undesireable element exists yet realibility is maintained (only intermittent misfire, surging, hesitation).

Poor - indicating an undesirable element exists which affects reliability or driver confidence (steady misfire, roughness, lack of power, response).

Fail - indicating extremely unreliable, possible unsafe conditions exist (frequent stalling, die-outs on acceleration, lack of throttle response).

General acceleration, cruise and idle quality were evaluated according to the rating system during the constant speed phase. During the acceleration from idle stage; the quality of acceleration during quarter, half, two-thirds and three-quarter throttle was rated. The restart phase was conducted after a ten minute engine-off period and includes an assessment of idle quality and the duration of crank time.

2.6.3 Federal Test Procedure (Mass Exhaust Emission Test)

The Federal Test Procedure was performed in accordance with procedures specified in 40 Federal Register 126. Preconditioning requirements for this test include a 12 to 24 hour soak period in an area with an ambient temperature between 20 and 30 degrees Centigrade (68 to 86 degrees Fahrenheit). Each vehicle remained stationary while soaking with the ignition in the unlock position and the transmission in neutral. Doors were unlocked and the window on the driver's side was rolled down.

None of the nine vehicles acquired for this work effort received those segments of the FTP which deal with evaporative loss measurements. Consequently, following the soak period, test vehicles were moved to the dynamometer for the mass exhaust emission segment of the FTP.

Before the test vehicle was placed on the dynamometer and secured, the proper inertia weight and load adjustments were set. During testing, the vehicle hood remained open and a cooling fan was placed in front of the engine approximately six to

twelve inches from the vehicle grille.

The Federal Test Procedure consists of three segments: the cold transient stage, the cold stabilized stage and the hot transient stage. Sampling during the initial cold transient portion was begun simultaneously with engine crank. This phase continued for 505 seconds at an average speed of 25.6 miles per hour over a cumulative roll distance of 3.59 miles. At the 505 second point, the exhaust sample was diverted from the first sample bag of the CVS to the second. This marked the beginning of the cold stabilized portion of the test. This segment covers 3.91 miles at an average speed of 16.0 miles per hour. Its duration is 869 seconds. At the end of this phase the engine was stopped, sampling was terminated and the vehicle was soaked on the dynamometer for ten minutes. After soaking, the vehicle was restarted and sampling was switched to a third CVS bag for 505 seconds at an average speed of 25.6 miles per hour. CVS sample and background bags were analyzed within ten minutes after completion of each phase of the test.

2.6.4 Highway Fuel Economy Test Procedure

The Highway Fuel Economy Test consists of vehicle operation on the dynamometer over a 10.2 mile, 765 second driving schedule with the vehicle in a warmed-up condition. Before testing was begun, each vehicle was driven at 50 mph on the dynamometer for three minutes. Within one minute of the end of the cruise period, the vehicle was brought to idle and the test begun. During the test, CVS dilute exhaust was diverted into a sample bag over the entire driving schedule. Sampling was terminated at the end of the schedule and the content of the sample bag was analyzed for HC, CO, CO_2 and NO_x content. Load settings, inertia weights and vehicle speed tolerances for the HFET are identical to those used for the Federal Test Procedure.

2.6.5 Federal Short Cycle Test

The Federal Short Cycle Test is a nine-mode CVS test consisting of vehicle operation over a 125 second driving schedule. Cumulative roll distance is 0.7536 miles.

Each mode and its duration are described below.

	MODE	DURATION OF MODE (secs)
1.	0-16 mph acceleration	6
2.	16-29 mph acceleration	23
3.	29 mph cruise	10
4.	29-37 mph acceleration	18
5.	37-42 mph acceleration	4.5
6.	42-37 mph acceleration	2.5
7.	37-20 mph deceleration	32
8.	20-0 mph deceleration	7.5
9.	Idle	21.5
	Total seconds	125.0

Inertia weight, horsepower loads and manual transmission shift speeds are the same as those used during the Federal Test Procedure.

The Federal Short Cycle was preceded by a six minute preconditioning period comprising a three minute soak with the engine off and a three minute idle (in neutral) period. During preconditioning the engine compartment remained open with the auxiliary cooling fan on. Total emissions over the full driving schedule were collected in one sample bag and analyzed within five minutes after the end of sampling.

2.6.6 Two Speed Idle Test

Raw tailpipe samples from vehicles operated at high idle and curb idle were analyzed during the Two Speed Idle Test. This brief evaluation was preceded by a six minute engine-off and a three minute idle period. At the end of the six minutes, the vehicle was operated in neutral for a maximum of three minutes at 2500 rpm and then at curb idle. Exhaust emissions were analyzed at each speed after rpm and analyzer outputs for CO, HC and NO_x had stabilized for a minimum of 30 seconds. Tests were conducted with the vehicle hood open and the auxiliary fan on.

2.6.7. Federal 3-Mode Test

This test is comprised of three steady state modes performed with the dynamometer loads set to simulate the average power (for all light duty vehicles) occuring at each of the three speeds during an FTP. The 3-Mode Test is preceded by a six minute (3 $\pm$ 1 minute engine-off, 3 $\pm$ 1 minute idle) preconditioning period performed with the hood open and the cooling fan on. Following preconditioning, the vehicle was operated for a maximum of three minutes at high cruise (52 mph) with the inertia weight set at the minimum level. The specified dynamometer horsepower was set for each speed during the stabilization period. Equilibrium of vehicle speed and the CO, HC and NO_x readings were maintained for 30 seconds before emissions were recorded. This procedure was repeated for the low cruise (25 mph) and idle modes. Since actual horsepower was used for this test, additional dynamometer coastdown calibrations at 25 and 52 mph were performed.

2.6.8 After Test Procedure

Basic engine parameters were measured after each test sequence to further document test conditions. These parameters consisted of; basic ignition timing, dwell (if applicable), idle speed, undiluted idle CO and HC. These measurements were performed according to procedures outlined on the emission data sticker.

2.6.9 Maladjustment and Disablement Inspection

This inspection consisted of a step-by-step evaluation of separate engine systems and their components to determine if each was functionally intact and complete. During the course of the examination the induction system, carburetor and fuel system, ignition system, EGR, air injection, PCV, exhaust system and evaporative control system were inspected for proper settings and system alignment. Disconnected hoses, lines and wires; missing or poorly fitted components were noted and repaired as part of the procedure. Maladjusted engine parameters such as timing, choke and idle rpm settings were also examined and corrected.

Parts which were judged to be deficient due to wear or manufacturer error were not corrected at this time but were addressed during the tune-up and repair segment of the work effort. Those vehicles which received corrective maintenance during this procedure were retested to provide data on the level of emissions produced by high mileage vehicles with properly adjusted engine systems operating with an average number of worn or defective components.

2.6.10 Emission Component Function Check

The Emission Component Function Check consists of a complete physical examination of each operating component in the emission control system. Unlike the Maladjustment and Disablement Inspection where engine systems are examined only to see if each is functionally intact and properly adjusted, this evaluation involves a more detailed systematic determination of the operational efficiency of separate components within the emission control system. The inspection was performed using guidelines and procedures outlined in the appropriate service manual or as specified by a manufacturer's representative. Inspection procedures generally consisted of:

1. Identification of component (e.g. idle enrichment delay solenoid on Chrysler vehicles)
2. Isolation and observation of operation (i.e. length of time solenoid was activated)
3. Comparison with manufacturer specifications (i.e. 30 to 40 seconds)

Components found to be malfunctioning were noted on the Emission Component Function Check Sheet and corrected during the Emission Control Component Repair segment of the program.

2.6.11 Emission Control Component Repair

The Emission Control Component Repair Procedure was performed after the Emission Component Function Check and consisted of the repair or replacement of malfunctioning and defective components identified during previous inspections. All repairs performed at this juncture of the work effort were recorded in the action column of the Emission Component Function Check Worksheet. In most cases,

maintenance was performed by ATL mechanics with the assistance and guidance of manufacturer's representatives. All replacements were made with the same types of parts originally used by the manufacturer.

Replaced parts were securely tagged and sent to the Environmental Protection Agency's laboratory in Ann Arbor, Michigan. Each tag contained the following information:

1. Name of part, including the part number (if applicable)
2. Vehicle number
3. Reason for presuming defect or other problem
4. Method for determining defect or other problem
5. Additional comments (if any) on operation, diagnostics involved, difficulty involved in obtaining replacements, or any other points that were of future interest in this area.

2.6.12 Determination of Failure

After completing the preceding inspection and repair procedures, most vehicles were able to pass or nearly pass the Federal Test Procedure using the following standards.

Vehicle Year	CO	HC	NO_x
1975 & 1976	15.0	1.5	3.1
1977	15.0	1.5	2.0

Vehicles with continued high emission levels were evaluated further to determine the source of emission control system failures. This evaluation was performed jointly between the EPA and the manufacturer. Because each of these vehicles already received a tune-up, including corrective maintenance of disabled or malfunctioning emission control components, suspected sources of emission control failure were generally limited to major engine components (e.g. distributor) although previously undiscovered malfunctioning emission control components were sometimes identified during the re-evaluation. Most corrective maintenance actions were followed by a retest

of the vehicle unless otherwise instructed by the Project Officer.

2.6.13 Catalyst Bypass Fabrication Procedures

Following the completion of repairs and the resolution of any additional emission control system malfunctions, each vehicle received a series of two test sequences designed to provide data on catalyst efficiency. The first sequence was performed after the as-received catalyst had been removed and replaced with a catalyst bypass. This unit was constructed to create a level of exhaust system backpressure comparable to that generated by the catalyst. Actual catalyst backpressure was initially determined by gauging stabilized pressure levels generated upstream to the as-received catalyst at a 60 mph cruise speed. After finding this pressure level the catalyst was removed and replaced with a stock tailpipe repair section (approximately 16 to 24 inches long) fitted with a circular plate or baffle at one end. The backpressure created by this unit was then adjusted by drilling a series of half inch diameter holes in the baffle until the pressure created by the bypass unit at 60 mph was within two inches H_2O of the actual catalyst backpressure. Because exhaust system configurations and pressures vary from vehicle to vehicle, a separate bypass unit was constructed for each vehicle tested.

Following a full sequence of tests, the bypass unit was removed and replaced with a new catalyst. After 50 miles of preconditioning, the vehicle was again tested before being returned to its owner. All as-received catalysts were tagged and delivered to the EPA for further inspection.

2.6.14 Test Vehicle Depreparation

Before a vehicle was returned to its owner the following procedures were performed.

1. Tires were rotated to the same configuration as received at the laboratory and tire pressures were adjusted to their original levels.
2. Test vehicle fuel tanks were refilled to full capacity.
3. Visual checks were performed to assure that the general status of the vehicle was the same as when it was brought to the laboratory.

2.7 DATA PROCESSING PROCEDURES

Accumulated raw test data and associated materials received a systematic review of each test point in the work effort from initial generation to final processing. These data accumulation and review procedures are described below.

2.7.1 Data Collection

Emission test procedures and laboratory conditions were monitored and controlled through the use of strip chart recorders. These units provided a constant read-out of data and also served to document test activities for later review. Test parameters registered on the recorders included emission analyzer outputs, wet and dry bulb measurements of air directed to the front of test vehicles and dilute exhaust stream temperatures. Driver/vehicle perfomance traces were also documented on a strip chart recorder and included speed calibrations and subsequent calibration checks performed before and after each test.

A NOVA 2 minicomputer was utilized to collect and integrate CVS sample and background bag emission data. Speed/time profiles were also generated for each test schedule by the computer and produced on the driver/vehicle performance trace. In addition to these functions, the computer totalized and recorded CVS mass pump revolutions during each exhaust emission test segment.

Movement of each test vehicle through segments of the work effort was controlled and documented through various raw data sheets. All data forms were collected in test packets which were assigned to each vehicle prior to testing. As testing progressed, relevant sheets were completed, signed and returned to the packet by the appropriate technician. Included in the packet were: all raw data sheets used to identify the vehicle, the vehicle exchange agreements, the completed vehicle owners questionnaire, raw data sheets used during tests, analyzer strip chart recordings, computer system sheets and punch tapes and all appropriate temperature strip chart recordings.

Laboratory personnel were also furnished a form indicating the daily test

schedule including the order each vehicle was to be tested and the estimated duration of each test segment. Preconditioning personnel were also furnished with a similar schedule indicating the time each vehicle was to be placed in soak.

2.7.2 Data Review and Editing

Vehicle packets were reviewed for completeness, accuracy and compliance with temperature and speed tolerances on a test by test basis. This review was performed as soon as possible after each test to allow an appropriate solution to any problems that might arise. The test packet was reviewed a second time after all tests had been completed. When practical, this was performed before the vehicle was released to the owner. After solving any remaining discrepancies, the completed packet was forwarded to the data processing department.

Data processing procedures included an additional review of packet contents by personnel not directly involved in the original tests. Following this, data from the on-site NOVA 2 minicomputer and raw data sheets were combined into a single punch tape which was input to an offsite, time-share computer. The combined information was subsequently listed back out and manually proofread against the original input to detect errors introduced through keypunch operations or transmission difficulties. When obvious computer errors had been resolved and corrected, a computerized edit program was applied to the data. The program subjects each entry to a test of reasonableness. If recorded information fails to fall within a predetermined range, the computer indicated the presence of a possible error and identified the area requiring additional investigation. Any discrepancies found to exist at this stage were resolved either through further clarifying information from test personnel, reference to test records or through a complete retest of the vehicle.

As soon as all problems were resolved, the data was reduced and printed out for a final review before the test was declared valid. When this process was completed, the data was delivered to the EPA in the form of interpreted 80 column punch cards

along with the completed data packet.

2.7.3 Calculation of Test Results

2.7.3.1 Federal Test Procedure Emission Data - Mass emission test results were calculated using equations specified in 40 Federal Register 126. Fuel economy data for this test was calculated using the carbon balance equation and reported in grams per mile for CO, CO_2, HC and NO_x.

2.7.3.2 Highway Fuel Economy Test - Exhaust emission results for this test were calculated using Federal Register equations and a distance constant of 10.242 miles per test. Fuel economy was calculated using these mass emission results and the carbon balance equation.

2.7.3.3 Federal Short Cycle - Results of the Federal Short Cycle Test were calculated using Federal Register equations and a distance constant of 0.7536 miles per test.

2.7.3.4 Two Speed Idle Test - Emission results for this test are comprised of tailpipe concentrations and are reported as measured.

2.7.3.5 Federal 3-Mode Test - Emission results from this test are also comprised of undiluted tailpipe concentrations and are reported as measured.

3. RESULTS

The tables on the following pages present the results of the Federal Test Procedure Mass Emission tests at the various stages of the testing sequence. Also, presented are averages for each of the manufacturer's and for the entire nine vehicles. Averages may be somewhat distorted as the results on two of the Ford vehicles indicates that the converters may have been significantly obstructed. This is indicated by the reduction in CO and HC emissions achieved by removing the converters and installing the bypass. These converters are now being subjected to a thorough analysis under a separate EPA contract. The results of the analysis will be detailed in a report entitled, "REPORT FOR WORK EFFORT #3, CONTRACT NO. 68-03-2693 - CHARACTERIZATION OF NINE HIGH MILEAGE CATALYTIC CONVERTERS FOR EPA".

CHRYSLER FEDERAL TEST PROCEDURE RESULTS - SUMMARY

Veh No.	Test Seq.	HC	CO	CO2	NOxc	MPG
511	1	3.22	45.3	416.6	2.77	17.8
	2	1.74	11.8	459.8	3.17	18.3
	3	3.00	22.9	473.1	2.54	17.1
	4	3.15	29.8	429.6	2.10	18.2
	5	1.65	20.1	470.5	1.34	17.5
512	1	4.36	77.7	523.0	3.29	13.5
	2	2.94	19.0	626.5	4.11	13.3
	3	3.75	16.6	765.3	2.08	11.0
	4	8.97	16.8	684.0	1.79	12.0
	5	0.93	21.8	757.5	0.67	11.2
513	1	0.65	05.3	664.1	7.36	13.2
	2	1.12	26.5	756.1	1.75	11.1
	3	0.74	04.6	765.1	2.12	11.5
	4	1.68	28.5	710.4	1.78	11.7
	5	0.62	14.3	734.7	1.34	11.7
CHRY 3 Veh.	1	2.55	42.8	534.6	4.47	14.6
	2	1.93	19.1	614.1	3.01	13.6
	3	2.50	14.7	667.8	2.25	12.7
	4	4.60	25.0	608.0	1.89	13.4
	5	1.07	18.7	654.2	1.12	12.9

FORD FEDERAL TEST PROCEDURE RESULTS - SUMMARY

Veh No.	Test Seq	HC	CO	CO2	NOxc	MPG
524	1	1.90	06.8	472.8	2.55	18.1
	2	1.15	08.5	506.6	2.55	17.0
	3	1.52	08.0	481.5	2.68	17.8
	4	2.09	20.7	449.4	2.41	18.2
	5	0.60	04.8	491.2	2.81	17.7
525	1	2.67	23.8	903.2	3.84	09.4
	2	2.55	34.0	971.8	3.10	08.6
	3	3.07	35.2	1277.9	3.06	06.6
	4	2.90	17.3	780.7	4.00	10.9
	5	2.13	14.3	871.6	4.44	09.8
526	1	3.25	20.1	771.7	5.65	10.9
	2	3.27	23.4	757.2	3.71	11.0
	3	2.04	11.0	739.4	6.38	11.6
	4	2.84	10.3	731.1	6.76	11.7
	5	2.05	08.0	743.2	6.21	11.6
FORD 3 Veh.	1	2.61	16.9	715.9	4.01	11.8
	2	2.32	22.0	745.2	3.12	11.3
	3	2.21	18.1	832.9	4.04	10.2
	4	2.61	16.1	653.7	4.39	12.9
	5	1.59	09.0	702.0	4.49	12.3

GENERAL MOTORS FEDERAL TEST PROCEDURE RESULTS - SUMMARY

Veh No.	Test Seq	HC	CO	CO2	NOxc	MPG
537	1	2.01	30.8	482.8	1.42	16.5
	2	0.83	08.1	476.7	1.26	18.0
	3	1.14	07.5	486.9	1.17	17.7
	4	3.35	09.1	453.1	1.25	18.6
	5	0.64	05.6	471.2	1.08	18.4
538	1	4.28	70.6	558.1	1.82	13.0
	2	1.99	13.7	602.0	2.33	14.1
	3	1.90	12.9	653.9	1.52	13.0
	4	4.07	21.0	655.2	1.42	12.7
	5	0.69	07.3	704.3	1.37	12.4
539	1	1.20	09.1	787.9	1.72	11.0
	3	1.41	11.9	685.3	1.87	12.5
	4	2.31	21.6	705.0	1.86	11.9
	5	0.59	08.4	731.7	1.49	11.9
GM 3 Veh.	1	2.50	36.8	609.6	1.65	13.1
	2	1.34	10.3	622.2	1.77	13.[illegible]
	3	1.48	10.8	608.7	1.52	14.1
	4	3.24	17.2	604.4	1.51	13.8
	5	0.64	07.1	635.7	1.31	13.7

FEDERAL TEST PROCEDURE RESULTS - SUMMARY

	Test Seq	HC	CO	CO2	NOxc	MPG
9 Veh.	1	2.55	32.2	620.0	3.38	13.1
	2	1.86	17.1	660.5	2.63	12.8
	3	2.06	14.5	703.1	2.60	12.1
	4	3.48	19.4	622.0	2.60	13.4
	5	1.10	11.6	664.0	2.31	12.9

PER CENT DECREASE FROM AS RECEIVED

Test Seq	HC	CO	NOxc	MPG
2	27	47	22	-2
3	19	55	23	-8
4	-36	40	23	2
5	57	64	32	-2

4. APPENDICES

APPENDIX A - LISTING OF VEHICLES AND TEST PARAMETERS

Legend

VEH. NO. - Vehicle number

YR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

CYL - Number of cylinders

BBL - Number of carburetor venturis (F: fuel injection)

T - Type of transmission (A: automatic; 2: semi-automatic; 3: 3-speed manual; 4: 4-speed manual; 5: 5-speed manual)

ENGINE FAMILY - Engine family

AC - Vehicle equipped with air conditioning: (Y: yes; N: no)

FT - Fuel tank capacity in gallons

I.WT - Dynamometer inertia weight setting

A.HP - Actual road load horsepower setting

ACL - Was 10% AHP added to simulate air conditioner: (Y: yes; N: no; M: manufacturer's certification AHP setting)

TEST NO. - Contractor run number

TEST DATE - Date of test (month/day/year)

IRPM - Idle RPM

TMG - Ignition timing in degrees (+ indicates before top dead center; - indicates after top dead center; 000 indicates top dead center)

DB - Dry bulb temperature (degrees Fahrenheit)

WB - Wet bulb temperature (degrees Fahrenheit)

BARO. - Barometric pressure (inches Hg)

The engine and test procedures were obtained as indicated by the following designations:

A) SPEC - Manufacturer's specifications

B) SEQ1 - Measured as-received from vehicle owner with indolene clear fuel.

C) SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure.

D) SEQ3 - Measured after vehicle maintenance procedure and emission component repair.

E) SEQ4 - Measured with catalytic converter bypass. .

F) SEQ5 - Measured after replacement of catalytic converter.

APPENDIX A

LISTING OF VEHICLES AND TEST PARAMETERS

ST. LOUIS

VEH. NO	YR	MAKE	MODL	CID	CYL	BBL	T	ENGINE FAMILY	AC	FT	I.WT	A.HP	ACL	TEST NO.	TEST DATE	IRPM	TMG	DB	WB	BARO.
511	75	PLYM	DUST	225	6	1	A	F-RG-CII	Y	16	3500	11.2	M							
														SPEC		750	000			
														SEQ1	S435	10/10/78	750	000	74	63 30.10
														SEQ2	S448	10/12/78	700	000	77	67 29.75
														SEQ3	S467	10/17/78	720	000	77	66 30.30
														SEQ4	S516	10/20/78	760	000	77	60 30.02
														SEQ5	S526	10/21/78	770	000	78	62 29.90
512	75	DODG	CHAR	360	8	2	A	F-LA2L-C	Y	26	4500	12.7	M							
														SPEC		750	+06			
														SEQ1	S428	10/09/78	680	+03	75	61 30.11
														SEQ2	S454	10/12/78	760	+06	78	68 29.78
														SEQ3	S464	10/13/78	700	+06	75	64 30.24
														SEQ4	S492	10/18/78	750	+06	76	65 30.30
														SEQ5	S512	10/20/78	700	+06	78	68 30.14
513	75	PLYM	STAW	318	8	2	A	F-LA2-6C	Y	21	5000	14.7	M							
														SPEC		750	+02			
														SEQ1	S449	10/12/78	730	+03	78	68 29.74
														SEQ2	S471	10/14/78	760	+04	77	66 30.32
														SEQ3	S482	10/17/78	650	+04	79	68 30.44
														SEQ4	S505	10/19/78	650	+03	77	66 30.28
														SEQ5	S516	10/20/78	650	+03	76	57 30.00
524	75	MERC	MONA	250	6	1	3	250 1CEF	Y	19	4000	12.0	M							
														SPEC		850	+04			
														SEQ1	S338	09/28/78	760	+03	79	61 30.27
														SEQ2	S353	09/29/78	810	+03	76	62 29.95
														SEQ3	S379	10/03/78	850	+03	76	64 29.99
														SEQ4	S397	10/05/78	925	+03	78	61 29.94
														SEQ5	S443	10/11/78	850	+03	77	66 29.82
525	75	FORD	CUST	400	8	2	A	351M/400 "E"	Y	24	5000	14.7	M							
														SPEC		700	+08			
														SEQ1	S349	09/29/78	710	+13	78	62 29.96
														SEQ2	S427	10/09/78	750	+08	78	63 30.15
														SEQ3	S442	10/11/78	780	+11	76	63 29.89
														SEQ4	S476	10/16/78	750	+09	78	67 30.10
														SEQ5	S481	10/17/78	700	+09	78	67 30.44
526	75	FORD	LTD	351	8	2	A	351M/400 1CET	Y	24	5000	14.7	M							
														SPEC		650	+08			
														SEQ1	S358	09/30/78	560	+06	76	65 30.04
														SEQ2	S372	10/02/78	610	+08	78	62 29.98
														SEQ3	S415	10/07/78	640	+06	78	63 30.23
														SEQ4	S434	10/10/78	600	+08	77	65 30.10
														SEQ5	S446	10/11/78	680	+06	74	64 29.74

AUTOMOTIVE TESTING LABORATORIES, INC.
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APPENDIX A (CONT)

LISTING OF VEHICLES AND TEST PARAMETERS

ST. LOUIS

VEH. NO.	YR	MAKE	MODL	CID	CYL	BBL	T	ENGINE FAMILY	AC	FT	I.WT	A.HP	ACL	TEST NO.	TEST DATE	IRPM	TMG	DB	WB	BARO.
537	75	CHEV	NOVA	250	6	1	A	10F13	N	21	3500	11.2	M							
												SPEC				550	+08			
												SEQ1		S534	10/23/78	610	+09	76	60	30.38
												SEQ2		S544	10/24/78	550	+09	77	60	30.16
												SEQ3		S562	10/26/78	520	+09	75	59	30.04
												SEQ4		S573	10/28/78	580	+09	76	58	30.20
												SEQ5		S584	10/30/78	600	+09	78	54	30.37
538	75	CHEV	MALI	350	8	2	A	10J23	Y	22	4500	14.0	M							
												SPEC				600	+06			
												SEQ1		S537	10/23/78	550	+04	76	60	30.38
												SEQ2		S550	10/25/78	500	+06	75	59	29.77
												SEQ3		S585	10/30/78	600	+06	77	54	30.37
												SEQ4		S606	11/03/78	600	+06	78	54	30.27
												SEQ5		S617	11/04/78	600	+06	78	56	30.05
539	75	BUIC	STAW	350	8	4	A	40J43	Y	22	4500	14.0	M							
												SPEC				600	+12			
												SEQ1		S538	10/24/78	580	+12	76	60	30.34
												SEQ3		S578	10/28/78	620	+12	75	58	30.37
												SEQ4		S595	11/01/78	640	+12	78	55	30.40
												SEQ5		S611	11/03/78	650	+12	79	54	30.14

APPENDIX B - LISTING OF TEST VEHICLES USAGE DATA

Legend

VEH. NO. - Vehicle number

YR - Model year

MAKE - Vehicle make

MODL - Vehicle model

ODOMETER - True mileage

N - Purchased new or used (1: new; 2: used)

PUR - Purchase date of vehicle (1: 0-3 mos; 2: 3-12 mos; 3: 1-2 yrs; 4: over 2 yrs ago)

YMT - Yearly vehicle miles traveled (1: 0-5000; 2: 5001-10,000; 3: 10,001-15,000; 4: 15,001-20,000; 5: 20,001-30,000; 6: over 30,001)

DRIVING WHERE - Where driving is done (1: almost all; 2: most; 3: some; 4: little or none)

- F: City expressway
- C: Major city street
- O: Other city street
- I: Rural expressway
- R: Other rural road

DRIVING HOW - How driving is done (1: almost all; 2: most; 3: some; 4: little or none)

- W: To and from work driving
- S: Shopping and errands
- B: business
- V: Other driving, vacations, social, etc.

L - Trip to the test lab (1: city streets only; 2: some expressways; 3: primarily expressways)

MI - Approximate miles traveled to lab

VEHICLE USE - Vehicle use (1: almost all; 2: most; 3: some; 4: little or none)

- A: Driver only
- B: Driver and one passenger
- C: Driver and two or more passengers
- D: Driver only with heavy cargo
- E: Driver, passenger, and cargo
- F: Towing a trailer

TR - Number of trips made on a typical day

F - How often is full throttle acceleration used per week (1: seldom; 2: once or twice; 3: 3-6 times; 4: every day)

OA - Overall fuel economy (0: don't know)

HD - Highway fuel economy (0: don't know)

CD - City driving fuel economy (0: don't know)

H - Hydrogen Sulfide odor in exhaust (1: never; 2: seldom; 3: occasionally; 4: frequently; 5: don't know)

U - Vehicle operated regularly, in competative events, or in transporting loads heavier than for which it was designed (1: yes; 2: no; 3: don't know)

DAMAGE - Major damage in any of the following areas (1: yes; 2: no)

A: Engine
B: Cooling System
C: Fuel System
D: Exhaust System
E: No Damage
F: Don't Know

APPENDIX B

LISTING OF VEHICLE USAGE DATA

ST. LOUIS

VEH. NO.	YR	MAKE	MODL	ODOMETER	N	PUR	YMT	--DRIVING-- WHERE FCOIR	HOW WSBV	L	MI	VEHUSE ABCDEF	TR	F	OA	HD	CD	H	U	DAMAGE ABCDEF
511	75	PLYM	DUST	138831	1	4	6	33344	4414	1	15	144444	4	4	18	20	16	1	2	222212
512	75	DODG	CHAR	75064	2	3	5	33344	3333	2	15	414444	6	3	15	16	14	4	2	222212
513	75	PLYM	STAW	71026	1	4	5	33334	3333	3	17	441444	5	4	15	0	0	2	2	222212
524	75	MERC	MONA	103977	1	4	6	44414	1444	3	25	144444	4	4	20	0	0	1	1	222122
525	75	FORD	CUST	108238	2	4	6	33344	3344	3	13	144444	2	1	13	15	11	1	2	212222
526	75	FORD	LTD	111512	1	4	6	14444	4414	3	20	144444	20	1	15	0	0	1	2	222212
537	75	CHEV	NOVA	89691	1	4	5	33444	3434	3	8	144444	4	3	17	0	0	2	2	222122
538	75	CHEV	MALI	107979	1	4	6	33444	3443	3	25	144444	2	1	0	0	0	1	2	222212
539	75	BUIC	STAW	137751	2	4	6	14444	3443	3	14	414444	3	4	14	0	0	1	2	222122

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX C - LISTING OF TEST VEHICLE MAINTENANCE DATA

Legend

VEH. NO. - Vehicle number

YR - Model year

MAKE - Vehicle make

MODL - Vehicle model

VIN - Vehicle Identification Number

PERFORM - Any engine performance problems (1: yes; 2: no)
- A: Hard starting
- B: Stalling
- C: Rough idle
- D: Engine misfiring
- E: Poor acceleration
- F: Stumbling
- G: Dieseling (after-run)
- H: Other
- I: No major problems

S - Reasonably satisfied with engine performance (1: yes; 2: most of the time; 3: no)

O - How long ago was the last oil change (1: too new not due; 2: due but not yet done; 3: 0-6 mos; 4: 6-12 mos; 5: over 1 yr; 6: don't know)

T - How often is vehicle tuned-up (1: no tune-up yet; 2: per mfrs recommendation; 3: every 6 mos; 4: every year; 5: less often; 6: don't know)

L - How long ago was the last tune-up (1: too new not due; 2: due but not yet done; 3: 0-6 mos; 4: 6-12 mos; 5: over 1 yr; 6: don't know)

U - Who performed this tune-up (1: no tune-up; 2: dealer; 3: independent garage; 4: tune-up clinic; 5: yourself 6: don't know)

C - Approximately how much did the tune-up cost (dollars or 1: no tune-up; 2: don't know)

R - Would you consider the vehicle has been maintained in accordance with the manufacturer's recommendations (1: yes; 2: no; 3: not sure; 4: don't know)

W - How many times has this vehicle been returned for warranty repairs (1: no warranty; 2: never returned; 3: once; 4: twice; 5: 3 or more; 6: don't know)

D - Was the vehicle returned for the correction of driveability problems (1: no warranty; 2: never returned; 3: yes; 4: no)

P - How long ago was it returned for the correction of any driveability problems (1: no warranty; 2: never returned; 3: 0-3 mos; 4: 3-6 mos; 5: over 6 mos; 6: don't know)

V - Does your vehicle require the use of unleaded fuel (1: yes; 2: no)

N - If your vehicle requires unleaded fuel how often is leaded fuel used (1: not required; 2: never; 3: seldom; 4: occasionally; 5: frequently; 6: don't know)

Pb - Lead content of owners fuel (grams per gallon, OS indicates any content greater than .1000 grams per gallon; NA indicates not applicable as leaded fuel is used).

FUEL - Brand name of fuel normally used

MMT - Manganese additive present (Y: yes; N: no; -: not applicable unleaded fuel not required)

M - Has this vehicle ever been modified by the installation of high performance equipment (Y: yes; N: no; -: don't know)

APPENDIX C

LISTING OF VEHICLE MAINTENANCE DATA

ST. LOUIS

VEH. NO.	YR	MAKE	MODL	VIN	PERFORM ABCDEFGHI	S	O	T	L	U	C	R	W	D	P	V	N	Pb	FUEL	MMT	MM
511	75	PLYM	DUST	VH29C5G141401	112211122	3	3	3	3	3	44	1	6	4	6	1	2	0.0410	VARIOUS	N	N
512	75	DODG	CHAR	XS22K5R190556	221221222	1	3	4	3	5	15	2	1	1	1	1	2	0.0730	VARIOUS	Y	N
513	75	PLYM	STAW	RL45G5A204295	212212122	2	3	3	3	3	40	1	4	4	2	1	2	0.0330	AMOCO	N	N
524	75	MERC	MONA	5W35L546550	222222221	1	3	3	3	4	30	1	2	2	2	1	2	0.0370	ZEPHYR	N	N
525	75	FORD	CUST	5U53S163337	222222221	1	3	4	4	3	50	1	1	1	1	1	2	0.0370	ZEPHYR	N	N
526	75	FORD	LTD	5P63H108751	222221222	1	3	2	6	6	2	1	5	4	2	1	2	0.0350	STANDARD	N	N
537	75	CHEV	NOVA	1X27D5W107760	211212122	1	3	3	3	5	5	1	4	4	2	1	2	0.0260	TEXACO	N	N
538	75	CHEV	MALI	1D29H5D400039	222222221	1	3	4	3	3	35	1	2	2	2	1	2	0.0200	AMOCO	N	N
539	75	BUIC	STAW	4F35J5H155792	222222221	1	3	3	3	5	45	1	1	1	1	1	2	0.0320	VICKERS	N	N

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX D - LISTING OF VEHICLE MAINTENANCE HISTORY

Legend

VEH. NO. - Vehicle number

YR - Model year

MAKE - Vehicle make

MODL - Vehicle model

TEST LAST YEAR - Was vehicle tested in last year's program (numbers are last year's vehicle number)

M - Was any maintenance performed since last test (1: yes; 2: no; 3: not tested)

T - Type of maintenance performed (1: warranty; 2: tune-up; 3: none; 4: not tested)

C - Approximately how much did the maintenance cost (dollars or 1: no maintenance; 2: don't know)

P - Who performed maintenance (1: no maintenance; 2: dealer; 3: independent garage; 4: tune-up clinic; 5: yourself; 6: don't know)

CAT - Has the catalytic converter ever been replaced on this vehicle (1: no catalyst; 2: yes; 3: no; 4: don't know)

FE - Do you accurately keep records of the fuel economy on this vehicle (Y: yes; N: no)

CF - Are you concerned with the fuel economy of this vehicle (Y: yes; N: no)

CI - Date of last city inspection (MMYY, 9999: don't know; 0000: never inspected)

P - Did the vehicle pass or fail the inspection (1: pass; 2: fail; 3: don't know or never inspected)

APPENDIX D

LISTING OF VEHICLE MAINTENANCE HISTORY

ST. LOUIS

VEH. NO.	YEAR	MAKE	MODL	TEST LAST YEAR	M	T	C	P	CAT	FE	CF	CI	P
511	1975	PLYM	DUST	NO	3	4	3	6	3	N	Y	0000	3
512	1975	DODG	CHAR	NO	3	4	3	6	3	N	Y	0000	3
513	1975	PLYM	STAW	NO	3	4	3	6	3	N	Y	0000	3
524	1975	MERC	MONA	NO	3	4	3	6	3	N	Y	0000	3
525	1975	FORD	CUST	NO	3	4	3	6	3	N	N	0000	3
526	1975	FORD	LTD	NO	3	4	3	6	3	Y	Y	0000	3
537	1975	CHEV	NOVA	NO	3	4	3	6	3	N	Y	0000	3
538	1975	CHEV	MALI	NO	3	4	3	6	3	N	N	0000	3
539	1975	BUIC	STAW	NO	3	4	3	6	3	N	N	0000	3

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX E - LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

Legend

VEH. NO. - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

TEST TYPE - Indicates the portion of the test or composite

- COLD TRANS - Cold transient portion of test
- COLD STABI - Cold stabilized portion of test
- HOT TRANS - Hot transient portion of test
- 75 FTP - 1975 Federal Test Procedure composite
- SEQ1 - Measured as-received from vehicle owner with indolene clear fuel.
- SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure.
- SEQ3 - Measured after vehicle maintenance procedure and emission component repair.
- SEQ4 - Measured with catalytic converter bypass.
- SEQ5 - Measured after replacement of catalytic converter

HC - Hydrocarbon emissions in grams per mile

CO - Carbon monoxide emissions in grams per mile

CO_2 - Carbon dioxide emissions in grams per mile

NO_{xc} - Oxides of nitrogen emission corrected for humidity in grams per mile

FUEL ECON MPG - Fuel Economy calculated by the carbon balance method in miles per gallon

IHC - Hydrocarbon concentration with vehicle at normal idle, measured with garage-type instrumentation in parts per million hexane equivalent

ICO (act) - Carbon monoxide concentration with vehicle at normal idle, measured with garage-type instrumentation in mole per cent

ICO (spec) - Carbon monoxide concentration with vehicle at normal idle, as specified by the manufacturer (N/A: no specifications available).

APPENDIX E

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
511	1975	PLYM	DUST	225	SEQ1 COLD TRANS	7.87	67.9	461.0	3.36	14.98
					SEQ1 COLD STABI	2.17	49.3	410.8	2.28	17.93
IHC: 110 ppm hexane					SEQ1 HOT TRANS	1.72	20.6	394.3	3.24	20.54
ICO [act]: 4.43 %CO					SEQ1 75 FTP	3.22	45.3	416.6	2.77	17.82
ICO [spec]: N/A %CO										
COMMENT : CAPS MISSING. ICO RICH. DEF WIRE IN THROTTLE STOP SOLENOID.										
					SEQ2 COLD TRANS	6.53	48.7	502.5	3.03	14.80
IHC: 29 ppm hexane					SEQ2 COLD STABI	0.37	1.4	463.1	3.10	19.03
ICO [act]: 0.01 %CO					SEQ2 HOT TRANS	0.74	3.9	421.3	3.42	20.65
ICO [spec]: N/A %CO					SEQ2 75 FTP	1.74	11.8	459.8	3.17	18.34
COMMENT : ADJ ICO, IRPM.										
					SEQ3 COLD TRANS	6.09	57.4	479.5	2.78	15.07
IHC: 557 ppm hexane					SEQ3 COLD STABI	2.14	16.9	488.5	2.19	17.01
ICO [act]: 0.21 %CO					SEQ3 HOT TRANS	2.30	8.4	438.8	3.02	19.32
ICO [spec]: N/A %CO					SEQ3 75 FTP	3.00	22.9	473.1	2.54	17.11
COMMENT : MAJOR TUNEUP. REPR THROTTLE STOP SOLENOID.										
					SEQ4 COLD TRANS	4.89	49.8	459.3	2.37	16.05
IHC: 640 ppm hexane					SEQ4 COLD STABI	2.65	30.9	437.4	1.83	17.96
ICO [act]: 1.67 %CO					SEQ4 HOT TRANS	2.77	12.8	392.5	2.40	21.06
ICO [spec]: N/A %CO					SEQ4 75 FTP	3.15	29.8	429.6	2.10	18.24
COMMENT : INSTALL CATALYST BYPASS.										
					SEQ5 COLD TRANS	2.68	40.4	489.0	1.62	15.82
IHC: 661 ppm hexane					SEQ5 COLD STABI	1.57	19.4	480.3	0.95	17.21
ICO [act]: 0.98 %CO					SEQ5 HOT TRANS	1.03	6.3	437.9	1.86	19.68
ICO [spec]: N/A %CO					SEQ5 75 FTP	1.65	20.1	470.5	1.34	17.49
COMMENT : REPL CATALYST.										
OTHER TESTS: HFET, SHORT TESTS										

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
512	1975	DODG	CHAR	360	SEQ1 COLD TRANS	8.01	88.0	521.0	3.37	12.96
IHC: 270 ppm hexane					SEQ1 COLD STABI	3.74	88.8	538.1	2.44	12.87
ICO [act]: 3.83 %CO					SEQ1 HOT TRANS	2.77	48.6	495.7	4.86	15.28
ICO [spec]: N/A %CO					SEQ1 75 FTP	4.36	77.7	523.0	3.29	13.47
					COMMENT CAPS MSG. FIRPM -400. EGR,INDUCT HOSES DISC. CCIE, TSS DEF. TIMING -3.					
					SEQ2 COLD TRANS	6.75	54.5	612.0	3.66	12.34
IHC: 85 ppm hexane					SEQ2 COLD STABI	2.04	9.5	658.5	3.83	13.05
ICO [act]: 0.06 %CO					SEQ2 HOT TRANS	1.77	10.5	576.4	4.97	14.83
ICO [spec]: N/A %CO					SEQ2 75 FTP	2.94	19.0	626.5	4.11	13.33
					COMMENT : ADJ ICO,IRPM,TIMING. CONN EGR, INDUCT HOSE.					
					SEQ3 COLD TRANS	15.17	71.4	831.9	2.58	8.94
IHC: 126 ppm hexane					SEQ3 COLD STABI	0 78	1.6	786 1	1.61	11.22
ICO [act]: 0.02 %CO					SEQ3 HOT TRANS	0.79	4.1	675.2	2.60	12.97
ICO [spec]: N/A %CO					SEQ3 75 FTP	3.75	16.6	765.3	2.08	11.05
					COMMENT : MAJOR TUNEUP. ADJ FIRPM. REPL THROTTLE STOP SOL, CCIE.					
					SEQ4 COLD TRANS	5.63	51.1	749.8	1.95	10.47
IHC: 934 ppm hexane					SEQ4 COLD STABI	11.55	8.0	691.2	1.35	11.99
ICO [act]: 0.20 %CO					SEQ4 HOT TRANS	6.55	7.7	620.8	2.51	13.58
ICO [spec]: N/A %CO					SEQ4 75 FTP	8.97	16.8	684.0	1.79	12.01
					COMMENT : INSTALL CATALYST BYPASS.					
					SEQ5 LD TRANS	3.07	50.6	759.2	1.30	10.46
IHC: 47 ppm hexane					SEQ5 COLD STABI	0.30	11.7	803.4	0.52	10.79
ICO [act]: 0.98 %CO					SEQ5 HOT TRANS	0.53	19.4	668.3	0.48	12.67
ICO [spec]: N/A %CO					SEQ5 75 FTP	0.93	21.8	757.5	0.67	11.17
					COMMENT : REPL CATALYST.					
OTHER TESTS: HFET, SHORT TESTS										

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
513	1975	PLYM	STAW	318	SEQ1 COLD TRANS	1.41	21.4	713.3	8.08	11.81
					SEQ1 COLD STABI	0.23	0.4	677.2	6.41	13.08
					SEQ1 HOT TRANS	0.87	2.6	602.1	8.63	14.58
					SEQ1 75 FTP	0.65	5.3	664.1	7.36	13.16
IHC: 67 ppm hexane										
ICO [act]: 0.04 %CO										
ICO [spec]: 0.3 %CO										
COMMENT : CAPS MSG. OSAC BYPASSED. EGR,TIC PLUGGED.										
					SEQ2 COLD TRANS	3.59	101.1	754.4	1.64	9.60
					SEQ2 COLD STABI	0.56	9.7	775.3	1.41	11.20
					SEQ2 HOT TRANS	0.34	2.2	720.6	2.47	12.24
					SEQ2 75 FTP	1.12	26.5	756.1	1.75	11.08
IHC: 35 ppm hexane										
ICO [act]: 0.02 %CO										
ICO [spec]: 0.3 %CO										
COMMENT : EGR,TIC UNPLUGED. CONN OSAC.										
					SEQ3 COLD TRANS	2.50	15.0	821.8	2.62	10.40
					SEQ3 COLD STABI	0.23	1.7	779.3	1.52	11.34
					SEQ3 HOT TRANS	0.38	2.3	695.1	2.91	12.68
					SEQ3 75 FTP	0.74	4.6	765.1	2.12	11.46
IHC: 31 ppm hexane										
ICO [act]: 0.02 %CO										
ICO [spec]: 0.3 %CO										
COMMENT : MAJOR TUNEUP. REP TIC.										
					SEQ4 COLD TRANS	3.42	79.7	751.9	1.75	9.99
					SEQ4 COLD STABI	1.27	18.3	713.7	1.45	11.89
					SEQ4 HOT TRANS	1.17	9.4	673.0	2.43	12.84
					SEQ4 75 FTP	1.68	28.5	710.4	1.78	11.67
IHC: 126 ppm hexane										
ICO [act]: 1.55 %CO										
ICO [spec]: 0.3 %CO										
COMMENT : INSTALL CATALYST BYPASS.										
					SEQ5 COLD TRANS	2.21	60.1	791.7	1.55	9.94
					SEQ5 COLD STABI	0.18	3.1	733.5	0.95	12.01
					SEQ5 HOT TRANS	0.24	1.4	694.0	1.92	12.74
					SEQ5 75 FTP	0.62	14.3	734.7	1.34	11.69
IHC: 22 ppm hexane										
ICO [act]: 0.02 %CO										
ICO [spec]: 0.3 %CO										
COMMENT : REPL CATALYST.										
OTHER TESTS: HFET, SHORT TESTS										

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
524	1975	MERC	MONA	250	SEQ1 COLD TRANS	5.42	17.5	503.7	3.31	16.18
					SEQ1 COLD STABI	0.85	1.8	485.8	1.89	18.06
					SEQ1 HOT TRANS	1.24	8.2	424.5	3.25	20.11
					SEQ1 75 FTP	1.90	6.8	472.8	2.55	18.13
					SEQ2 COLD TRANS	2.41	22.9	521.5	3.29	15.71
					SEQ2 COLD STABI	0.73	3.0	530.8	2.06	16.50
					SEQ2 HOT TRANS	1.02	8.2	449.0	2.92	19.08
					SEQ2 75 FTP	1.15	8.5	506.6	2.55	16.95
					SEQ3 COLD TRANS	4.22	24.6	498.4	3.03	16.13
					SEQ3 COLD STABI	0.73	1.6	497.6	2.13	17.67
					SEQ3 HOT TRANS	0.98	7.8	438.0	3.47	19.57
					SEQ3 75 FTP	1.52	8.0	481.5	2.68	17.79
					SEQ4 COLD TRANS	3.45	35.3	459.6	2.75	16.87
					SEQ4 COLD STABI	1.61	16.4	461.5	1.91	18.03
					SEQ4 HOT TRANS	1.99	18.0	418.4	3.12	19.59
					SEQ4 75 FTP	2.09	20.7	449.4	2.41	18.17
					SEQ5 COLD TRANS	1.48	12.2	518.7	3.33	16.36
					SEQ5 COLD STABI	0.23	0.6	503.6	2.27	17.57
					SEQ5 HOT TRANS	0.64	7.3	446.7	3.45	19.28
					SEQ5 75 FTP	0.60	4.8	491.2	2.81	17.73

IHC: 39 ppm hexane
ICO [act]: 0.01 %CO
ICO [spec]: N/A %CO
COMMENT : CAPS MISSING. CHOKE 4NL.

IHC: 42 ppm hexane
ICO [act]: 0.02 %CO
ICO [spec]: N/A %CO
COMMENT : ADJ CHOKE.

IHC: 32 ppm hexane
ICO [act]: 0.01 %CO
ICO [spec]: N/A %CO
COMMENT : MAJOR TUNEUP.

IHC: 48 ppm hexane
ICO [act]: 0.47 %CO
ICO [spec]: N/A %CO
COMMENT : INSTALL CATALYST BYPASS.

IHC: 24 ppm hexane
ICO [act]: 0.01 %CO
ICO [spec]: N/A %CO
COMMENT : REPL CATALYST.

OTHER TESTS: HFET, SHORT TESTS

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
525	1975	FORD	CUST	400	SEQ1 COLD TRANS	4.92	53.1	907.7	4.03	8.82
					SEQ1 COLD STABI	2.36	15.4	936.9	3.32	9.16
					SEQ1 HOT TRANS	1.57	17.6	835.1	4.70	10.23
					SEQ1 75 FTP	2.67	23.8	903.2	3.84	9.35
IHC: 96 ppm hexane										
ICO [act]: 0.13 %CO										
ICO [spec]: N/A %CO										
COMMENT : CAP MSG. TMG +5. EFE,EGR HOSE DISC. AIR,VAC ADV,#5 WIRE DEF.										
					SEQ2 COLD TRANS	4.48	59.5	999.7	3.60	8.01
					SEQ2 COLD STABI	2.15	30.0	998.7	2.53	8.43
					SEQ2 HOT TRANS	1.86	22.3	899.2	3.84	9.44
					SEQ2 75 FTP	2.55	34.0	971.8	3.10	8.59
IHC: 45 ppm hexane										
ICO [act]: 0.10 %CO										
ICO [spec]: N/A %CO										
COMMENT : ADJ TIMING. REPL AIR PUMP AND BELT. CONN EFE, REPL EGR HOSE.										
					SEQ3 COLD TRANS	7.21	79.0	1243.2	3.58	6.38
					SEQ3 COLD STABI	1.79	18.1	1386.2	2.69	6.25
					SEQ3 HOT TRANS	2.37	34.7	1097.3	3.36	7.66
					SEQ3 75 FTP	3.07	35.2	1277.9	3.06	6.61
IHC: 45 ppm hexane										
ICO [act]: 0.10 %CO										
ICO [spec]: N/A %CO										
COMMENT : MAJOR TUNEUP. REPL VAC ADV DIAPHRAGM, #5 PLUG WIRE.										
					SEQ4 COLD TRANS	3.74	41.5	839.0	3.63	9.69
					SEQ4 COLD STABI	2.80	10.2	794.1	3.65	10.84
					SEQ4 HOT TRANS	2.45	12.8	711.1	4.96	12.01
					SEQ4 75 FTP	2.90	17.3	780.7	4.00	10.86
IHC: 96 ppm hexane										
ICO [act]: 0.25 %CO										
ICO [spec]: N/A %CO										
COMMENT : INSTALL CATALYST BYPASS. ADJ TIMING.										
					SEQ5 COLD TRANS	3.33	38.7	919.4	4.17	8.96
					SEQ5 COLD STABI	1.89	7.0	888.8	3.92	9.80
					SEQ5 HOT TRANS	1.67	9.9	802.6	5.64	10.78
					SEQ5 75 FTP	2.13	14.3	871.6	4.44	9.85
IHC: 58 ppm hexane										
ICO [act]: 0.09 %CO										
ICO [spec]: N/A %CO										
COMMENT : REPLACE CATALYST.										
OTHER TESTS: HFET, SHORT TESTS										

APPENDIX E (CONT)

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
526	1975	FORD	LTD	351	SEQ1 COLD TRANS	6.64	38.6	814.9	6.35	9.90
IHC: 75 ppm hexane					SEQ1 COLD STABI	2.44	16.3	805.1	4.59	10.59
ICO [act]: 0.37 %CO					SEQ1 HOT TRANS	2.24	13.4	675.3	7.16	12.62
ICO [spec]: N/A %CO					SEQ1 75 FTP	3.25	20.1	771.7	5.65	10.91
COMMENT : CAPS MSG. EGR PLUG. EGR PVS,IND TEMP SENSOR, DELAY VALVE DEF.										
					SEQ2 COLD TRANS	10.23	51.2	799.7	3.62	9.72
IHC: 64 ppm hexane					SEQ2 COLD STABI	1.56	18.1	780.6	3.27	10.90
ICO [act]: 0.36 %CO					SEQ2 HOT TRANS	1.27	12.6	680.4	4.62	12.60
ICO [spec]: N/A %CO					SEQ2 75 FTP	3.27	23.4	757.2	3.71	11.03
COMMENT : ADJ TIMING. UNPLUG EGR.										
					SEQ3 COLD TRANS	3.76	24.6	766.2	6.93	10.87
IHC: 136 ppm hexane					SEQ3 COLD STABI	1.61	8.2	765.9	5.03	11.32
ICO [act]: 0.05 %CO					SEQ3 HOT TRANS	1.58	6.0	668.5	8.56	13.00
ICO [spec]: N/A %CO					SEQ3 75 FTP	2.04	11.0	739.4	6.38	11.63
COMMENT : MAJOR TUNEUP. REPL EGR PVS,INDUCT TEMP SENSOR, DELAY VALVE.										
					SEQ4 COLD TRANS	3.50	21.6	768.5	7.54	10.91
IHC: 211 ppm hexane					SEQ4 COLD STABI	2.57	7.4	750.9	5.17	11.51
ICO [act]: 0.08 %CO					SEQ4 HOT TRANS	2.87	7.3	665.1	9.19	12.94
ICO [spec]: N/A %CO					SEQ4 75 FTP	2.84	10.3	731.1	6.76	11.73
COMMENT : INSTALL CATALYST BYPASS.										
					SEQ5 COLD TRANS	6.18	22.6	787.6	6.38	10.53
IHC: 209 ppm hexane					SEQ5 COLD STABI	0.93	3.6	762.3	5.08	11.51
ICO [act]: 0.03 %CO					SEQ5 HOT TRANS	1.07	5.5	673.1	8.25	12.95
ICO [spec]: N/A %CO					SEQ5 75 FTP	2.05	8.0	743.2	6.21	11.64
COMMENT : REPL CATALYST.										
OTHER TESTS: HFET, SHORT TESTS										

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
537	1975	CHEV	NOVA	250	SEQ1 COLD TRANS	4.78	43.0	529.0	2.50	14.51
					SEQ1 COLD STABI	1.50	35.1	472.9	1.01	16.66
					SEQ1 HOT TRANS	0.89	13.3	467.0	1.40	18.08
					SEQ1 75 FTP	2.01	30.8	482.8	1.42	16.51
IHC: 176 ppm hexane										
ICO [act]: 2.52 %CO										
ICO [spec]: N/A %CO										
COMMENT : CAPS MISSING.										
					SEQ2 COLD TRANS	1.93	31.9	525.2	2.28	15.27
					SEQ2 COLD STABI	0.49	1.4	467.9	0.87	18.82
					SEQ2 HOT TRANS	0.65	2.9	456.8	1.22	19.15
					SEQ2 75 FTP	0.83	8.1	476.7	1.26	18.04
IHC: 77 ppm hexane										
ICO [act]: 0.01 %CO										
ICO [spec]: N/A %CO										
COMMENT : ADJ ICO,IRPM. REPR EGR HOSE.										
					SEQ3 COLD TRANS	3.70	34.0	543.0	1.92	14.59
					SEQ3 COLD STABI	0.42	0.1	475.3	0.89	18.61
					SEQ3 HOT TRANS	0.59	1.4	466.5	1.13	18.86
					SEQ3 75 FTP	1.14	7.5	486.9	1.17	17.67
IHC: 84 ppm hexane										
ICO [act]: 0.01 %CO										
ICO [spec]: N/A %CO										
COMMENT : MAJOR TUNEUP.										
					SEQ4 COLD TRANS	5.89	30.5	483.6	2.16	16.13
					SEQ4 COLD STABI	2.79	2.8	446.3	0.92	19.31
					SEQ4 HOT TRANS	2.49	5.0	443.2	1.20	19.34
					SEQ4 75 FTP	3.35	9.1	453.1	1.25	18.56
IHC: 849 ppm hexane										
ICO [act]: 0.18 %CO										
ICO [spec]: N/A %CO										
COMMENT : INSTALL CATALYST BYPASS.										
					SEQ5 COLD TRANS	2.50	26.4	521.2	1.61	15.55
					SEQ5 COLD STABI	0.11	0.0	460.1	0.92	19.27
					SEQ5 HOT TRANS	0.25	0.4	454.7	0.98	19.46
					SEQ5 75 FTP	0.64	5.6	471.2	1.08	18.41
IHC: 19 ppm hexane										
ICO [act]: 0.01 %CO										
ICO [spec]: N/A %CO										
COMMENT : REPL CATALYST.										
OTHER TESTS: HFET, SHORT TESTS										

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
538	1975	CHEV	MALI	350	SEQ1 COLD TRANS	5.28	61.5	608.6	2.77	12.29
IHC: 239 ppm hexane					SEQ1 COLD STABI	4.66	89.4	555.6	1.08	12.49
ICO [act]: 5.03 %CO					SEQ1 HOT TRANS	2.81	41.7	524.7	2.52	14.81
ICO [spec]: N/A %CO					SEQ1 75 FTP	4.28	70.6	558.1	1.82	13.00
COMMENT : CAPS MISSING. TIMING -2.										
					SEQ2 COLD TRANS	3.92	59.9	618.4	3.07	12.24
IHC: 243 ppm hexane					SEQ2 COLD STABI	1.41	1.1	621.6	1.58	14.13
ICO [act]: 0.02 %CO					SEQ2 HOT TRANS	1.66	2.8	552.2	3.22	15.80
ICO [spec]: N/A %CO					SEQ2 75 FTP	1.99	13.7	602.0	2.33	14.09
COMMENT : ADJ TIMING, ICO, IRPM.										
					SEQ3 COLD TRANS	3.54	30.3	669.9	2.24	12.18
IHC: 152 ppm hexane					SEQ3 COLD STABI	1.46	8.9	675.2	1.02	12.79
ICO [act]: 0.01 %CO					SEQ3 HOT TRANS	1.49	7.5	601.2	1.93	14.37
ICO [spec]: N/A %CO					SEQ3 75 FTP	1.90	12.9	653.9	1.52	13.05
COMMENT : MAJOR TUNEUP. REPL FUEL PUMP.										
					SEQ4 COLD TRANS	5.88	36.7	695.0	2.11	11.51
IHC: 485 ppm hexane					SEQ4 COLD STABI	3.81	18.7	660.9	0.97	12.64
ICO [act]: 0.18 %CO					SEQ4 HOT TRANS	3.20	13.6	614.4	1.77	13.74
ICO [spec]: N/A %CO					SEQ4 75 FTP	4.07	21.0	655.2	1.42	12.66
COMMENT : INSTALL CATALYST BYPASS.										
					SEQ5 COLD TRANS	2.40	17.6	689.5	1.78	12.25
IHC: 16 ppm hexane					SEQ5 COLD STABI	0.19	3.8	722.3	0.91	12.18
ICO [act]: 0.04 %CO					SEQ5 HOT TRANS	0.34	6.5	680.9	1.95	12.82
ICO [spec]: N/A %CO					SEQ5 75 FTP	0.69	7.3	704.3	1.37	12.36
COMMENT : REPLACE CATALYST.										
OTHER TESTS: HFET, SHORT TESTS										

LISTING OF FEDERAL TEST PROCEDURE RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	TEST TYPE	-EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
539	1975	BUIC	STAW	350	SEQ1 COLD TRANS	4.02	39.1	871.9	2.00	9.38
					SEQ1 COLD STABI	0.41	0.7	796.5	1.43	11.11
					SEQ1 HOT TRANS	0.56	2.7	708.1	2.05	12.43
IHC: 67 ppm hexane					SEQ1 75 FTP	1.20	9.1	787.9	1.72	11.01
ICO [act]: 0.00 %CO										
ICO [spec]: N/A %CO										
COMMENT : FRESH AIR TUBE, EFE HOSE, VAC BREAK HOSE DEFECTIVE.										
					SEQ3 COLD TRANS	5.44	55.2	738.1	1.72	10.54
IHC: 45 ppm hexane					SEQ3 COLD STABI	0.32	0.2	691.9	1.71	12.80
ICO [act]: 0.01 %CO					SEQ3 HOT TRANS	0.46	1.5	632.8	2.30	13.94
ICO [spec]: N/A %CO					SEQ3 75 FTP	1.41	11.9	685.3	1.87	12.53
COMMENT : MAJOR TUNEUP. REPL FRESH AIR TUBE,EFE,VAC BREAK HOSES,SEC VAC BRK,CARB GASKET										
					SEQ4 COLD TRANS	4.26	52.6	781.4	1.79	10.11
IHC: 200 ppm hexane					SEQ4 COLD STABI	1.82	13.1	712.2	1.67	12.02
ICO [act]: 0.43 %CO					SEQ4 HOT TRANS	1.79	14.4	633.7	2.27	13.41
ICO [spec]: N/A %CO					SEQ4 75 FTP	2.31	21.6	705.0	1.86	11.89
COMMENT : INSTALL CATALYST BYPASS. REPL LOWER RADIATOR HOSE AND ANTIFREEZE.										
					SEQ5 COLD TRANS	2.33	36.9	803.2	1.40	10.22
IHC: 19 ppm hexane					SEQ5 COLD STABI	0.12	0.7	736.9	1.36	12.02
ICO [act]: 0.01 %CO					SEQ5 HOT TRANS	0.17	1.6	668.0	1.81	13.23
ICO [spec]: N/A %CO					SEQ5 75 FTP	0.59	8.4	731.7	1.49	11.88
COMMENT : REPL CATALYST. WATER PUMP WAS LEAKING AND WAS REPLACED AFTER TEST 5.										
OTHER TESTS: HFET, SHORT TESTS										

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19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX F - LISTING OF HIGHWAY FUEL ECONOMY AND EMISSION RESULTS ON INDIVIDUAL VEHICLES

Legend

VEH. NO. - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

SEQ. - Test sequence
- A) SEQ1 - Measured as-received from vehicle owner with indolene clear fuel
- B) SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure
- C) SEQ3 - Measured after vehicle maintenance procedure and emission component repair
- D) SEQ4 - Measured with catalytic converter bypass
- E) SEQ5 - Measured after replacement of catalytic converter

HC - Hydrocarbon emission in grams per mile

CO - Carbon Monoxide emissions in grams per mile

CO_2 - Carbon Dioxide emissions in grams per mile

NO_{xc} - Oxides of Nitrogen emissions corrected for humidity in grams per mile

FUEL ECON MPG - Fuel economy in miles per gallon, calculated using the carbon balance method

APPENDIX F

LISTING OF HIGHWAY FUEL ECONOMY & EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	- EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
511	1975	PLYM	DUST	225	SEQ1	0.40	4.3	320.9	2.66	26.99
					SEQ2	0.20	0.9	337.3	2.90	26.16
					SEQ3	0.45	1.8	350 9	2.42	24.99
					SEQ4	1.14	5.3	321.0	1.94	26.66
					SEQ5	0.25	2.0	338.3	1.80	25.94
512	1975	DODG	CHAR	360	SEQ1	1.21	13.4	394.5	4.56	21.16
					SEQ2	0.95	5.4	418.7	4.44	20.63
					SEQ3	0.22	2.1	486.7	1.98	18.08
					SEQ4	0.96	3.2	447.8	2.09	19.46
					SEQ5	0.47	28.0	456.1	0.49	17.69
513	1975	PLYM	STAW	318	SEQ1	0.11	0.1	466.6	7.55	19.00
					SEQ2	0.08	0 3	572.0	1.66	15.50
					SEQ3	0.07	0.3	583.0	1.71	15.21
					SEQ4	0.38	3.1	545.2	1.71	16.10
					SEQ5	0.04	0.2	554.5	1.40	15.99
524	1975	MERC	MONA	250	SEQ1	0.30	1.1	355.7	3.54	24.76
					SEQ2	0.27	1.6	364.1	3 22	24.16
					SEQ3	0.28	1.2	370.7	3.80	23.77
					SEQ4	0.62	6.3	345.8	3.39	24.82
					SEQ5	0.07	0.1	362.5	3.89	24.46
525	1975	FORD	CUST	400	SEQ1	0.67	23.9	688.8	3.82	12.18
					SEQ2	0.60	32.4	645.2	2.68	12.72
					SEQ3	0.50	16.1	741 7	2.02	11.55
					SEQ4	0.98	12.2	540.4	3.88	15.77
					SEQ5	0.59	6.4	597.4	4.05	14.57
526	1975	FORD	LTD	351	SEQ1	0 74	4.8	525.1	6.59	16.59
					SEQ2	0.68	6.7	569.5	5.15	15.24
					SEQ3	0.75	2.2	520.6	8.63	16.86
					SEQ4	1.09	3.8	528.1	9.22	16.51
					SEQ5	0.50	2.1	511.9	7.68	17.18
537	1975	CHEV	NOVA	250	SEQ1	0.15	1.7	377.6	0.94	23.31
					SEQ2	0.11	0.5	385.8	0.80	22.94
					SEQ3	0.16	0.5	406.9	0.67	21.74
					SEQ4	1.01	4.8	391.9	0.80	22.04
					SEQ5	0.05	0.3	398.6	0.63	22.23
538	1975	CHEV	MALI	350	SEQ1	0.80	8.7	431.3	2.63	19.83
					SEQ2	0.44	0.8	432.2	3.05	20.41
					SEQ3	0.33	1.3	466.8	2.01	18.89
					SEQ4	1.10	6.9	474.6	1.94	18.15
					SEQ5	0.11	2.4	537.2	2.79	16.39

LISTING OF HIGHWAY FUEL ECONOMY & EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	- EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
539	1975	BUIC	STAW	350	SEQ1	0.12	0.5	558.0	1.79	15.87
					SEQ3	0.19	1.3	480.6	2.13	18.37
					SEQ4	0.78	15.9	483.0	1.94	17.39
					SEQ5	0.05	1.0	530.0	1.94	16.69

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX G - LISTING OF FEDERAL SHORT CYCLE EMISSION RESULTS ON INDIVIDUAL VEHICLES

Legend

VEH. NO. - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

SEQ. - Test sequence
- A) SEQ1 - Measured as-received from vehicle owner with indolene clear fuel
- B) SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure
- C) SEQ3 - Measured after vehicle maintenance procedure and emission component check
- D) SEQ4 - Measured with catalytic converter bypass
- E) SEQ5 - Measured after replacement of catalytic converter

HC - Hydrocarbon emission in grams per mile

CO - Carbon Monoxide emissions in grams per mile

CO_2 - Carbon Dioxide emissions in grams per mile

NO_{xc} - Oxides of Nitrogen emissions corrected for humidity in grams per mile

FUEL ECON MPG - Fuel economy in miles per gallon, calculated using the carbon balance method

APPENDIX G

LISTING OF FEDERAL SHORT CYCLE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	- EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
511	1975	PLYM	DUST	225	SEQ1	1.80	29.4	319.5	2.62	23.89
					SEQ2	0.36	2.8	348.6	2.74	25.06
					SEQ3	2.30	6.0	370.9	2.16	22.89
					SEQ4	3.72	14.8	319.8	1.75	25.01
					SEQ5	2.55	10.4	360.6	1.22	23.05
512	1975	DODG	CHAR	360	SEQ1	3.02	47.1	418.3	2.43	17.68
					SEQ2	1.55	6.3	503.1	3.77	17.13
					SEQ3	2.12	2.0	576.7	1.52	15.13
					SEQ4	6.53	5.1	502.1	1.33	16.72
					SEQ5	0.67	17.8	595.3	0.15	14.19
513	1975	PLYM	STAW	318	SEQ1	0.32	1.0	510.3	4.85	17.30
					SEQ2	0.23	0.2	588.8	1.18	15.05
					SEQ3	0.27	0.4	607.4	1.14	14.58
					SEQ4	1.36	8.6	560.6	1.18	15.34
					SEQ5	0.19	0.5	555.7	1.16	15.93
524	1975	MERC	MONA	250	SEQ1	0.62	0.4	348.9	1.88	25.25
					SEQ2	0.61	1.0	378.3	1.53	23.25
					SEQ3	0.71	0.7	364.5	2.02	24.13
					SEQ4	1.60	6.1	344.5	1.70	24 72
					SEQ5	0.13	0.0	365.2	2.00	24.27
525	1975	FORD	CUST	400	SEQ1	1.92	26.5	673.5	2.12	12.30
					SEQ2	1.25	18.6	1256.7	4.34	6.88
					SEQ3	1.89	25.8	1108.8	2.38	7.68
					SEQ4	2.59	8.2	596.7	2.00	14.37
					SEQ5	1.19	4.5	651.9	2.53	13.39
526	1975	FORD	LTD	351	SEQ1	3.00	26.9	556 8	3.79	14.59
					SEQ2	1.70	11.8	642.7	4.54	13.31
					SEQ3	1.78	1.7	570.6	4.38	15.33
					SEQ4	2.74	4.1	580.2	5.48	14.91
					SEQ5	1.32	1.5	571.5	4.49	15.36
537	1975	CHEV	NOVA	250	SEQ1	2.40	14.8	365.1	0.86	22.42
					SEQ2	0.40	0.2	370.3	0.64	23.86
					SEQ3	0.23	0.1	349.5	0 77	25.33
					SEQ4	3.87	3.0	348.8	0.72	24.27
					SEQ5	0.08	0.0	374.8	0.75	23.66
538	1975	CHEV	MALI	350	SEQ1	3.97	60.3	434.0	1.03	16.39
					SEQ2	1.53	1.4	463.6	1.38	18.86
					SEQ3	1.25	3 8	523.3	0.90	16.64
					SEQ4	4.16	8.8	516.0	0.97	16.34
					SEQ5	0.10	1.2	534.1	0.74	16.55

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX G (CONT)

LISTING OF FEDERAL SHORT CYCLE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	- EMISSION RESULTS (gm/mi)- HC	CO	CO_2	NO_{xc}	FUEL ECON MPG
539	1975	BUIC	STAW	350	SEQ1	0.42	0.5	585.6	1.38	15.10
					SEQ3	0.30	0.3	524.0	1.88	16.90
					SEQ4	2.51	10.9	539.6	1.45	15.72
					SEQ5	0.08	0.6	543.3	1.44	16.30

APPENDIX H - LISTING OF TWO SPEED IDLE EMISSION RESULTS ON INDIVIDUAL VEHICLES

Legend

VEH. NO. - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

SEQ. - Test sequence
- A) SEQ1 - Measured as-received from vehicle owner with indolene clear fuel
- B) SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure
- C) SEQ3 - Measured after vehicle maintenance procedure and emission component check
- D) SEQ4 - Measured with catalytic converter bypass
- E) SEQ5 - Measured after replacement of catalytic converter

2250 RPM - Readings taken with engine at 2250 RPM, transmission in neutral

IDLE - Readings taken with engine at normal idle, transmission in neutral

HC - Unburned Hydrocarbon emissions in ppm hexane

CO - Carbon Monoxide emissions in mole per cent

NO - Oxides of Nitrogen emissions in ppm

APPENDIX H

LISTING OF TWO SPEED IDLE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	2500 RPM HC ppmh	2500 RPM CO %	2500 RPM NO ppm	IDLE HC ppmh	IDLE CO %	IDLE NO ppm
511	1975	PLYM	DUST	225	SEQ1	33	0.02	312	109	4.43	77
					SEQ2	32	0.01	281	29	0.01	136
					SEQ3	77	0.01	321	559	0.22	74
					SEQ4	145	0.24	311	640	1.73	74
					SEQ5	84	0.00	292	657	1.05	15
512	1975	DODG	CHAR	360	SEQ1	75	0.65	328	269	3.87	42
					SEQ2	55	0.08	366	84	0.06	73
					SEQ3	50	0.03	157	125	0.03	37
					SEQ4	222	0.11	170	934	0.22	24
					SEQ5	43	1.59	113	46	1.05	43
513	1975	PLYM	STAW	318	SEQ1	48	0.02	294	67	0.02	75
					SEQ2	36	0.02	75	35	0.02	64
					SEQ3	34	0.02	71	31	0.03	52
					SEQ4	72	0.17	60	124	1.62	48
					SEQ5	21	0.01	69	22	0.03	61
524	1975	MERC	MONA	250	SEQ1	22	0.02	190	39	0.01	49
					SEQ2	25	0.03	125	41	0.02	41
					SEQ3	24	0.02	137	32	0.01	59
					SEQ4	28	0.20	128	48	0.50	41
					SEQ5	19	0.01	107	24	0.01	45
525	1975	FORD	CUST	400	SEQ1	95	0.26	270	96	0.15	100
					SEQ2	22	0.08	234	39	0.09	89
					SEQ3	43	0.27	145	46	0.11	119
					SEQ4	98	0.42	180	96	0.27	131
					SEQ5	68	0.19	184	58	0.10	128
526	1975	FORD	LTD	351	SEQ1	37	0.07	265	74	0.38	47
					SEQ2	30	0.09	305	63	0.37	46
					SEQ3	43	0.07	488	136	0.06	68
					SEQ4	53	0.09	276	211	0.09	30
					SEQ5	48	0.04	253	210	0.03	38
537	1975	CHEV	NOVA	250	SEQ1	151	0.02	92	174	2.48	52
					SEQ2	74	0.02	88	78	0.01	52
					SEQ3	56	0.02	94	85	0.02	50
					SEQ4	197	0.28	62	849	0.20	39
					SEQ5	23	0.01	69	19	0.01	35
538	1975	CHEV	MALI	350	SEQ1	87	1.34	157	238	4.98	40
					SEQ2	41	0.05	225	243	0.02	27
					SEQ3	107	0.05	155	152	0.01	80
					SEQ4	227	0.34	133	485	0.20	61
					SEQ5	28	0.04	124	14	0.05	66

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX H (CONT)

LISTING OF TWO SPEED IDLE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	2500 RPM HC ppmh	2500 RPM CO %	2500 RPM NO ppm	IDLE HC ppmh	IDLE CO %	IDLE NO ppm
539	1975	BUIC	STAW	350	SEQ1	31	0.01	113	68	0.00	55
					SEQ3	26	0.04	122	44	0.02	66
					SEQ4	80	0.63	92	200	0.44	45
					SEQ5	19	0.02	108	19	0.02	54

APPENDIX I - LISTING OF FEDERAL THREE MODE EMISSION RESULTS ON INDIVIDUAL VEHICLES

Legend

VEH. NO. - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

SEQ. - Test Sequence
- A) SEQ1 - Measured as-received from vehicle owner with indolene clear fuel
- B) SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure
- C) SEQ3 - Measured after vehicle maintenance procedure and emission component check
- D) SEQ4 - Measured with catalytic converter bypass
- E) SEQ5 - Measured after replacement of catalytic converter

MODE - Identifies the mode of the Three Mode Test

RLHP - Dynamometer load used in test as specified. Reported values are as measured on the dynamometer during the test.

HC - Exhaust Hydrocarbon concentration in ppm hexane

CO - Exhaust Carbon Monoxide concentration in mole per cent

NO - Exhaust Oxides of Nitrogen concentration in ppm

THREE MODE HORSE POWER CHART

NADA WEIGHT RANGE	FTP ROAD LOAD ACT. H.P. RNG	25 MPH ACT HP	52 MPH ACT HP
1476 - 1725	4.51 - 5.50	4.0	7.5
1476 - 1725	5.51 - 6.50	4.5	8.5
1476 - 1725	6.51 - 7.50	4.5	9.5
1476 - 1725	7.51 - 8.50	4.5	10.5
1726 - 1975	4.51 - 5.50	5.0	8.0
1726 - 1975	5.51 - 6.50	5.0	9.0
1726 - 1975	6.51 - 7.50	5.0	10.0
1726 - 1975	7.51 - 8.50	5.0	10.5
1726 - 1975	8.51 - 9.50	5.0	12.0
1726 - 1975	9.51 - 10.50	5.0	12.5
1726 - 1975	10.51 - 11.50	5.0	14.0
1976 - 2225	5.51 - 6.50	5.5	9.5
1976 - 2225	6.51 - 7.50	5.5	10.5
1976 - 2225	7.51 - 8.50	5.5	11.0
1976 - 2225	8.51 - 9.50	5.5	12.0
1976 - 2225	9.51 - 10.50	5.5	13.0
1976 - 2225	10.51 - 11.50	5.5	14.0
1976 - 2225	11.51 - 12.50	5.5	15.0
2226 - 2475	6.51 - 7.50	6.0	10.5
2226 - 2475	7.51 - 8.50	6.0	11.5
2226 - 2475	8.51 - 9.50	6.0	12.5
2226 - 2475	9.51 - 10.50	6.0	13.5
2226 - 2475	10.51 - 11.50	6.0	14.5
2226 - 2475	11.51 - 12.50	6.0	15.5
2226 - 2475	12.51 - 13.50	6.0	16.5
2476 - 2850	5.51 - 6.50	6.5	10.5
2476 - 2850	6.51 - 7.50	6.5	11.0
2476 - 2850	7.51 - 8.50	6.5	12.0
2476 - 2850	8.51 - 9.50	6.5	13.0
2476 - 2850	9.51 - 10.50	6.5	13.5
2476 - 2850	10.51 - 11.50	6.5	14.5
2476 - 2850	11.51 - 12.50	6.5	16.0
2476 - 2850	12.51 - 13.50	6.5	16.5
2851 - 3350	5.51 - 6.50	7.5	11.0
2851 - 3350	6.51 - 7.50	7.5	12.0
2851 - 3350	7.51 - 8.50	7.5	13.0
2851 - 3350	8.51 - 9.50	7.5	13.5
2851 - 3350	9.51 - 10.50	7.5	14.5
2851 - 3350	10.51 - 11.50	7.5	15.5
2851 - 3350	11.51 - 12.50	7.5	16.0
2851 - 3350	12.51 - 13.50	7.5	17.5
2851 - 3350	13.51 - 14.50	7.5	18.5
3351 - 3850	6.51 - 7.50	8.5	13.0
3351 - 3850	7.51 - 8.50	8.5	14.0
3351 - 3850	8.51 - 9.50	8.5	14.5
3351 - 3850	9.51 - 10.50	8.5	15.5
3351 - 3850	10.51 - 11.50	8.5	16.5
3351 - 3850	11.51 - 12.50	8.5	17.0
3351 - 3850	12.51 - 13.50	8.5	18.0
3351 - 3850	13.51 - 14.50	8.5	19.0
3351 - 3850	14.51 - 15.50	8.5	20.0
3851 - 4350	6.51 - 7.50	9.5	13.5
3851 - 4350	7.51 - 8.50	9.5	14.5
3851 - 4350	8.51 - 9.50	9.5	15.5
3851 - 4350	9.51 - 10.50	9.5	16.5
3851 - 4350	10.51 - 11.50	9.5	17.0
3851 - 4350	11.51 - 12.50	9.5	18.0
3851 - 4350	12.51 - 13.50	9.5	19.0
3851 - 4350	13.51 - 14.50	9.5	19.5
3851 - 4350	14.51 - 15.50	9.5	20.5
3851 - 4350	15.51 - 16.50	9.5	21.5
4351 - 4850	6.51 - 7.50	10.5	15.0
4351 - 4850	7.51 - 8.50	10.5	15.5
4351 - 4850	8.51 - 9.50	10.5	16.5
4351 - 4850	9.51 - 10.50	10.5	17.0
4351 - 4850	10.51 - 11.50	10.5	18.0
4351 - 4850	11.51 - 12.50	10.5	19.0
4351 - 4850	12.51 - 13.50	10.5	19.5
4351 - 4850	13.51 - 14.50	10.5	21.0
4351 - 4850	14.51 - 15.50	10.5	21.5
4351 - 4850	15.51 - 16.50	10.5	22.5
4851 - 5350	6.51 - 7.50	11.5	16.0
4851 - 5350	7.51 - 8.50	11.5	16.5
4851 - 5350	8.51 - 9.50	11.5	17.0
4851 - 5350	9.51 - 10.50	11.5	18.0
4851 - 5350	10.51 - 11.50	11.5	19.0
4851 - 5350	11.51 - 12.50	11.5	19.5
4851 - 5350	12.51 - 13.50	11.5	20.5
4851 - 5350	13.51 - 14.50	11.5	21.5
4851 - 5350	14.51 - 15.50	11.5	22.5
4851 - 5350	15.51 - 16.50	11.5	23.0
4851 - 5350	16.51 - 17.50	11.5	24.0
5351 - 5850	7.51 - 8.50	12.5	17.5
5351 - 5850	8.51 - 9.50	12.5	18.5
5351 - 5850	9.51 - 10.50	12.5	19.0
5351 - 5850	10.51 - 11.50	12.5	20.0
5351 - 5850	11.51 - 12.50	12.5	20.5
5351 - 5850	12.51 - 13.50	12.5	21.5
5351 - 5850	13.51 - 14.50	12.5	22.0
5351 - 5850	14.51 - 15.50	12.5	23.0
5351 - 5850	15.51 - 16.50	12.5	24.0
5351 - 5850	16.51 - 17.50	13.0	25.0
5351 - 5850	17.51 - 18.50	13.0	25.5

APPENDIX I

LISTING OF FEDERAL THREE MODE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	MODE	RLHP	HC ppmh	CO %	NO ppm
511	1975	PLYM	DUST	225	SEQ1	52 MPH	15.5	52	0.03	1091
					SEQ1	25 MPH	7.5	140	1.27	1439
					SEQ1	IDLE (D)		164	4.43	100
					SEQ1	IDLE (N)		138	4.34	77
					SEQ2	52 MPH	15.5	37	0.02	897
					SEQ2	25 MPH	7.5	36	0.02	1733
					SEQ2	IDLE (D)		50	0.14	203
					SEQ2	IDLE (N)		26	0.04	98
					SEQ3	52 MPH	15.5	52	0 01	728
					SEQ3	25 MPH	7.5	70	0.00	1159
					SEQ3	IDLE (D)		419	0.98	134
					SEQ3	IDLE (N)		432	0.85	95
					SEQ4	52 MPH	15.5	127	0.17	690
					SEQ4	25 MPH	7.5	153	0.31	1140
					SEQ4	IDLE (D)		440	3.02	96
					SEQ4	IDLE (N)		432	2.69	77
					SEQ5	52 MPH	15.5	79	0.02	699
					SEQ5	25 MPH	7.5	67	0.02	1077
					SEQ5	IDLE (D)		447	1.97	19
					SEQ5	IDLE (N)		722	1.24	16
512	1975	DODG	CHAR	360	SEQ1	52 MPH	19.1	74	0.10	1965
					SEQ1	25 MPH	9.4	127	1.48	719
					SEQ1	IDLE (D)		144	4.17	51
					SEQ1	IDLE (N)		228	4.21	41
					SEQ2	52 MPH	19.4	59	0 16	1279
					SEQ2	25 MPH	9.6	74	0.04	931
					SEQ2	IDLE (D)		67	0.04	105
					SEQ2	IDLE (N)		78	0.08	64
					SEQ3	52 MPH	19.0	39	0.06	436
					SEQ3	25 MPH	9.5	34	0.04	310
					SEQ3	IDLE (D)		51	0.03	42
					SEQ3	IDLE (N)		159	0.03	31
					SEQ4	52 MPH	19.0	161	0.13	484
					SEQ4	25 MPH	9.5	145	0.14	308
					SEQ4	IDLE (D)		759	0.17	16
					SEQ4	IDLE (N)		1197	0.23	13
					SEQ5	52 MPH	19.0	24	0.82	97
					SEQ5	25 MPH	9.5	34	0.49	147
					SEQ5	IDLE (D)		31	0.09	31
					SEQ5	IDLE (N)		30	0.68	19

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX I (CONT)

LISTING OF FEDERAL THREE MODE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	MODE	RLHP	HC ppmh	CO %	NO ppm
513	1975	PLYM	STAW	318	SEQ1	52 MPH	20.5	32	0.01	1754
					SEQ1	25 MPH	9.5	32	0 01	987
					SEQ1	IDLE (D)		31	0.01	113
					SEQ1	IDLE (N)		45	0.01	51
					SEQ2	52 MPH	20.5	24	0.02	209
					SEQ2	25 MPH	9.5	26	0.01	373
					SEQ2	IDLE (D)		30	0.03	78
					SEQ2	IDLE (N)		38	0.02	63
					SEQ3	52 MPH	20.5	24	0.02	225
					SEQ3	25 MPH	9.5	21	0 02	279
					SEQ3	IDLE (D)		25	0.03	63
					SEQ3	IDLE (N)		33	0.03	50
					SEQ4	52 MPH	20.5	36	0.12	203
					SEQ4	25 MPH	9.5	48	0.11	474
					SEQ4	IDLE (D)		84	1.87	67
					SEQ4	IDLE (N)		102	1.53	47
					SEQ5	52 MPH	20.5	23	0.01	227
					SEQ5	25 MPH	9.5	22	0.01	462
					SEQ5	IDLE (D)		23	0.03	55
					SEQ5	IDLE (N)		28	0.04	50
524	1975	MERC	MONA	250	SEQ1	52 MPH	15.9	31	0.03	1230
					SEQ1	25 MPH	7.6	43	0.02	399
					SEQ1	IDLE (N)		35	0.02	51
					SEQ2	52 MPH	15.8	41	0.01	922
					SEQ2	25 MPH	7.4	40	0.02	313
					SEQ2	IDLE (N)		49	0.00	41
					SEQ3	52 MPH	15.9	35	0.04	1098
					SEQ3	25 MPH	7.7	48	0.03	428
					SEQ3	IDLE (N)		37	0.02	59
					SEQ4	52 MPH	15.8	44	0.23	1024
					SEQ4	25 MPH	7 3	69	0 41	433
					SEQ4	IDLE (N)		55	0.51	42
					SEQ5	52 MPH	16.0	25	0.01	897
					SEQ5	25 MPH	7.5	25	0.00	305
					SEQ5	IDLE (N)		26	0.00	48

APPENDIX I (CONT)

LISTING OF FEDERAL THREE MODE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	MODE	RLHP	HC ppmh	CO %	NO ppm
525	1975	FORD	CUST	400	SEQ1	52 MPH	21.3	53	0.34	831
					SEQ1	25 MPH	10.6	63	0.28	639
					SEQ1	IDLE (D)		138	0.20	370
					SEQ1	IDLE (N)		82	0.25	132
					SEQ2	52 MPH	20.9	27	0.39	857
					SEQ2	25 MPH	10.2	27	0.17	446
					SEQ2	IDLE (D)		55	0.10	182
					SEQ2	IDLE (N)		44	0.10	88
					SEQ3	52 MPH	21.5	38	0.86	478
					SEQ3	25 MPH	10.5	49	0.41	139
					SEQ3	IDLE (D)		84	0.10	434
					SEQ3	IDLE (N)		51	0.19	118
					SEQ4	52 MPH	21.5	65	0.46	941
					SEQ4	25 MPH	10.2	87	0.22	309
					SEQ4	IDLE (D)		146	0.12	1147
					SEQ4	IDLE (N)		87	0.20	214
					SEQ5	52 MPH	21.5	54	0.19	721
					SEQ5	25 MPH	10.5	67	0.11	218
					SEQ5	IDLE (D)		95	0.05	690
					SEQ5	IDLE (N)		64	0.11	126
526	1975	FORD	LTD	351	SEQ1	52 MPH	21.6	44	0.11	1457
					SEQ1	25 MPH	10.7	51	0.06	491
					SEQ1	IDLE (D)		107	0.68	83
					SEQ1	IDLE (N)		707	0.37	69
					SEQ2	52 MPH	21.3	51	0.12	806
					SEQ2	25 MPH	10.5	61	0.08	518
					SEQ2	IDLE (D)		772	0.54	106
					SEQ2	IDLE (N)		596	0.35	57
					SEQ3	52 MPH	21.5	68	0.09	2625
					SEQ3	25 MPH	10.4	75	0.06	642
					SEQ3	IDLE (D)		151	0.04	171
					SEQ3	IDLE (N)		222	0.06	65
					SEQ4	52 MPH	21.5	66	0.10	1666
					SEQ4	25 MPH	[illegible]	80	0.08	522
					SEQ4	IDLE (D)		176	0.07	90
					SEQ4	IDLE (N)		221	0.10	28
					SEQ5	52 MPH	21.5	53	0.06	1668
					SEQ5	25 MPH	10.5	43	0.05	470
					SEQ5	IDLE (D)		126	0.05	122
					SEQ5	IDLE (N)		327	0.07	40

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX I (CONT)

LISTING OF FEDERAL THREE MODE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	MODE	RLHP	HC ppmh	CO %	NO ppm
537	1975	CHEV	NOVA	250	SEQ1	52 MPH	15.5	202	0.01	210
					SEQ1	25 MPH	7.5	141	0.00	687
					SEQ1	IDLE (D)		222	4.34	70
					SEQ1	IDLE (N)		238	3.32	47
					SEQ2	52 MPH	15.5	29	0.02	185
					SEQ2	25 MPH	7.5	35	0.02	300
					SEQ2	IDLE (D)		43	0.02	103
					SEQ2	IDLE (N)		107	0.02	48
					SEQ3	52 MPH	15.5	46	0.02	108
					SEQ3	25 MPH	7.5	34	0.00	291
					SEQ3	IDLE (D)		41	0.00	107
					SEQ3	IDLE (N)		104	0.00	46
					SEQ4	52 MPH	15.5	214	0.20	78
					SEQ4	25 MPH	7.5	182	0.10	272
					SEQ4	IDLE (D)		258	0.10	90
					SEQ4	IDLE (N)		1047	0.20	32
					SEQ5	52 MPH	15.5	18	0.01	120
					SEQ5	25 MPH	7.5	14	0.01	355
					SEQ5	IDLE (D)		14	0.01	79
					SEQ5	IDLE (N)		18	0.02	38
538	1975	CHEV	MALI	350	SEQ1	52 MPH	19.5	85	0.12	835
					SEQ1	25 MPH	9.5	196	2.07	202
					SEQ1	IDLE (D)		356	6.00	39
					SEQ1	IDLE (N)		298	5.26	35
					SEQ2	52 MPH	19.5	62	0.06	943
					SEQ2	25 MPH	9.5	78	0.02	369
					SEQ2	IDLE (D)		124	0.00	52
					SEQ2	IDLE (N)		305	0.01	25
					SEQ3	52 MPH	19.5	51	0.04	594
					SEQ3	25 MPH	9.5	66	0.04	209
					SEQ3	IDLE (D)		81	0.02	198
					SEQ3	IDLE (N)		177	0.02	71
					SEQ4	52 MPH	19.5	164	0.18	654
					SEQ4	25 MPH	9.5	158	0.22	173
					SEQ4	IDLE (D)		267	0.14	160
					SEQ4	IDLE (N)		696	0.21	58
					SEQ5	52 MPH	19.5	28	0.02	565
					SEQ5	25 MPH	9.5	28	0.02	138
					SEQ5	IDLE (D)		23	0.03	151
					SEQ5	IDLE (N)		24	0.04	60

AUTOMOTIVE TESTING LABORATORIES,INC.
19900 E. COLFAX, AURORA, COLO. 80011

LISTING OF FEDERAL THREE MODE EMISSION RESULTS ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	SEQ.	MODE	RLHP	HC ppmh	CO %	NO ppm
539	1975	BUIC	STAW	350	SEQ1	52 MPH	21.2	25	0.03	434
					SEQ1	25 MPH	8.7	26	0.01	268
					SEQ1	IDLE (D)		36	0.01	134
					SEQ1	IDLE (N)		131	0.01	59
					SEQ3	52 MPH	21.2	27	0.04	723
					SEQ3	25 MPH	8.7	28	0.01	699
					SEQ3	IDLE (D)		27	0.02	153
					SEQ3	IDLE (N)		59	0.02	63
					SEQ4	52 MPH	21.2	104	0.67	595
					SEQ4	25 MPH	8.7	109	0.69	581
					SEQ4	IDLE (D)		100	0.42	121
					SEQ4	IDLE (N)		195	0.46	45
					SEQ5	52 MPH	21.2	18	0.03	589
					SEQ5	25 MPH	8.7	15	0.03	644
					SEQ5	IDLE (D)		14	0.03	127
					SEQ5	IDLE (N)		18	0.03	57

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX J - LISTING OF VEHICLE DRIVEABILITY EVALUATIONS

Legend

VEH. NO. - Vehicle number

YR - Vehicle year

MAKE - Vehicle make

MODL - Vehicle model

TEST SEQ. - Test sequence
- A) SEQ1 - Measured as-received from vehicle owner with indolene clear fuel
- B) SEQ2 - Measured after vehicle emission control system enablement and adjustment procedure
- C) SEQ3 - Measured after vehicle maintenance procedure and emission component check
- D) SEQ4 - Measured with catalytic converter bypass
- E) SEQ5 - Measured after replacement of catalytic converter

CONSTANT SPEED PHASE

NS - Number of stalls or pass outs upon slight acceleration to road speed

AQ - Acceleration quality (E: excellent; G: good; F: fair; P: poor; U: fail)

CQ - Cruise quality (E: excellent; G: good; F: fair; P: poor; U: fail)

SA - Slight acceleration response or passing quality (E: excellent; G: good; F: fair; P: poor; U: fail)

IO - Idle quality at stop with air conditioner on (E: excellent; G: good; F: fair; P: poor; U: fail)

IF - Idle quality at stop with air conditioner off (E: excellent; G: good; F: fair; P: poor; U: fail)

ACCELERATION FROM STOP PHASE

1/4 - Quality of acceleration under 1/4 throttle (E: excellent; G: good; F: fair; P: poor; U: fail)

1/2 - Quality of acceleration under 1/2 throttle (E: excellent; G: good; F: fair; P: poor; U: fail)

2/3 - Quality of acceleration under 2/3 throttle (E: excellent; G: good; F: fair; P: poor; U: fail)

3/4 - Quality of acceleration under 3/4 throttle (E: excellent; G: good; F: fair; P: poor; U: fail)

RESTART PHASE

CT - Cranking time to start after ten minutes in seconds

IQ - Idle quality after restart (E: excellent; G: good; F: fair; P: poor; U: fail)

COLD START & IDLE PHASE

CT - Initial cranking time in seconds

ND - Number of engine die-outs after start

NS - Number of engine stalls after gear selection

HL - Hesitation, lag upon slight acceleration (Y: yes; N: no)

IQ - Idle quality (E: excellent; G: good; F: fair; P: poor; U: fail)

DRIVE-AWAY PHASE

N1 - Number of stalls or pass-outs upon slight acceleration to road speed

A1 - Acceleration quality (E: excellent; G: good; F: fair; P: poor; U: fail)

I1 - Idle quality after 0.2 mile @ stop (E: excellent; G: good; F: fair; P: poor; U: fail)

N2 - Number of stalls or pass-outs upon slight acceleration to speed

A2 - Acceleration quality after 0.2 mile @ stop (E: excellent G: good; F: fair; P: poor; U: fail)

I2 - Idle quality after 2.6 mile @ stop (E: excellent; G: good; F: fair; P: poor; U: fail)

Pass-outs are defined as restart from "off idle" stall

Die-outs are defined as restart from stall at idle

The codes for idle, acceleration and cruise quality are defined as follows:

E - Excellent - No trace of undesirable elements (smooth, even, responsive)

G - Good - Slight trace, small indication of an undesirable element (initial unevenness, roughness, hesitation, quickly overcome)

F - Fair - Undesirable element exists yet reliability is retained (only intermittent misfire, surging, hesitation)

P - Poor - Undesirable element exists which affects reliability or driver confidence (steady misfire, roughness, lack of power, response)

U - Fail - Extremely unreliable, possible unsafe conditions exist (frequent stalling, die-outs on acceleration, lack of throttle response)

The Constant Speed Phase, Acceleration from Stop Phase, and the Restart Phase are performed during the ten minute preconditioning drive. The Cold Start and Idle Phase and the Drive-Away Phase are performed on the dynamometer during the Cold Transient portion of the Federal Testing Procedure.

DRIVEABILITY EVALUATION FORM - PREP DRIVER

CITY _____ PREP DRIVER _____

THIS EVALUATION PERFORMED PRIOR TO WHICH TEST SEQUENCE?	DP
VEHICLE NUMBER	
A) CONSTANT SPEED PHASE	
1) No. stalls, pass-outs* upon slight acceleration to road speed	
2) Acceleration quality**	
3) Cruise quality	
4) Slight acceleration response (passing) quality	
5) Idle quality at stop with air 'on' (Enter 9 if not equipped)	
6) Idle quality at stop with air 'off'	
B) ACCELERATION FROM STOP PHASE	
7) Quality of acceleration under 1/4 throttle	
8) Quality of acceleration under 1/2 throttle	
9) Quality of acceleration under 2/3 throttle	
10) Quality of acceleration under 3/4 throttle	
C) RE-START PHASE	
11) Cranking time to start after 10 minutes (in seconds)	
12) Idle quality after re-start	
D) REID VAPOR PRESSURE FOR TEST FUEL	
13) Reid vapor pressure for test fuel	

* Pass-outs are defined as re-start from 'off idle' stall and die-outs are defined as re-start from stall at idle.

**Codes for idle, acceleration & cruise quality:

5) Excellent - No trace of undesireable elements (smooth, even, responsive)

4) Good - Slight trace, small indication of an undesireable element (initial unevenness, roughness, hesitation quickly overcome)

3) Fair - Undesireable element exists yet reliability is maintained (only intermittent misfire, surging hesitation)

2) Poor - Undesireable element exists which effects reliability or driver confidence (steady misfire, roughness, lack of power, response)

1) Fail - Extremely unreliable, possible unsafe conditions exist (frequent stalling, die-outs on acceleration, lack of throttle response)

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DRIVEABILITY EVALUATION FORM - DYNO DRIVER

CITY _____ DYNO DRIVER _____

THIS EVALUATION PERFORMED DURING WHICH TEST SEQUENCE?	DD
VEHICLE NUMBER	

A) COLD START & IDLE PHASE (DYNAMOMETER)

1) Initial cranking time (in seconds)	
2) Number of engine die-outs* after start	
3) Number of engine stalls after gear selection	
4) Hesitation, lag upon slight acceleration (1-Yes 2-No)	
5) Idle quality**	

B) DRIVE-AWAY PHASE (DYNAMOMETER)

6) No. stalls, pass-outs* upon slight acceleration to road speed	
7) Acceleration quality	
8) Idle quality after 0.7 mile at stop	
9) No. stalls, pass-outs upon slight acceleration to road speed	
10) Acceleration quality	
11) Idle quality after 2.6 mile at stop	

* Pass-outs are defined as re-start from 'off idle' stall and die-outs are defined as re-start from stall at idle.

**Codes for idle, acceleration & cruise quality:

5) Excellent - No trace of undesireable elements (smooth, even, responsive)

4) Good - Slight trace, small indication of an undesireable element (initial unevenness, roughness, hesitation quickly overcome)

3) Fair - Undesireable element exists yet reliability is maintained (only intermittent misfire, surging hesitation)

2) Poor - Undesireable element exists which effects reliability or driver confidence (steady misfire, roughness, lack of power, response)

1) Fail - Extremely unreliable, possible unsafe conditions exist (frequent stalling, die-outs on acceleration, lack of throttle response)

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APPENDIX J

LISTING OF VEHICLE DRIVEABILITY EVALUATIONS

ST. LOUIS

VEH. NO.	YR	MAKE	MODL	TEST SEQ.	CONSTANT SPEED PHASE						ACCELERATION FROM STOP PHASE				RE-START PHASE		COLD START & IDLE PHASE					DRIVE-AWAY PHASE					
					NS	AQ	CQ	SA	IO	IF	1/4	1/2	2/3	3/4	CT	IQ	CT	ND	NS	HL	IQ	N1	A1	I1	N2	A2	I2
511	56	PLYM	DUST	SEQ1	4	U	P	F	F	F	P	P	F	F	3	F	1	0	0	Y	U	5	F	F	3	G	G
				SEQ2	2	P	P	P	F	F	P	F	F	F	2	F	1	1	0	Y	P	6	F	F	3	F	F
				SEQ3	4	U	E	U	F	F	P	P	U	U	2	F	20	0	0	Y	P	1	F	F	1	G	G
				SEQ4	0	G	E	G	G	G	G	G	G	G	2	G	9	0	0	Y	P	2	P	F	0	P	F
				SEQ5	0	F	G	G	F	G	G	F	F	P	3	F	9	0	0	Y	P	4	P	F	3	P	F
512	58	DODG	CHAR	SEQ1	0	F	F	F	F	G	F	G	G	G	2	F	2	0	1	Y	G	1	F	G	0	F	G
				SEQ2	0	G	G	G	F	G	F	G	G	G	3	F	10	0	0	Y	F	0	F	F	1	G	G
				SEQ3	0	F	G	G	F	G	F	G	G	G	2	F	7	1	0	Y	P	2	P	P	2	P	P
				SEQ4	0	F	G	G	F	G	F	G	G	G	2	G	2	0	0	Y	P	0	P	F	0	F	F
				SEQ5	0	G	G	G	G	G	G	G	G	G	2	G	9	0	0	N	F	0	F	G	0	G	G
513	58	PLYM	STAW	SEQ1	0	E	E	E	F	G	E	E	E	E	4	G	2	0	0	N	G	0	G	G	0	F	G
				SEQ2	0	G	E	G	E	E	G	G	G	G	2	E	1	0	0	N	G	0	G	G	0	E	E
				SEQ3	0	E	E	E	F	G	E	E	E	E	2	E	3	3	0	Y	F	0	F	G	0	G	G
				SEQ4	0	E	E	E	G	E	E	E	E	E	2	E	2	0	0	N	G	0	G	G	0	G	G
				SEQ5	0	G	G	G	G	G	G	G	E	E	2	G	1	0	0	N	G	0	G	G	0	E	E
524	56	MERC	MONA	SEQ1	0	G	G	G	G	E	G	G	E	E	3	G	1	0	0	Y	F	3	F	F	0	F	F
				SEQ2	0	G	G	G	G	E	G	G	E	E	2	G	2	0	0	N	F	0	F	G	0	E	E
				SEQ3	0	G	G	G	G	G	G	G	G	G	1	G	1	0	0	Y	F	0	F	G	0	G	G
				SEQ4	0	G	G	G	G	E	G	E	E	E	2	E	1	0	0	Y	G	0	G	G	0	G	G
				SEQ5	0	G	G	G	G	G	G	G	G	G	2	G	1	0	0	N	G	0	G	G	0	G	G
525	58	FORD	CUST	SEQ1	0	G	G	G	G	G	G	G	G	G	3	F	2	0	0	N	F	0	F	E	0	E	E
				SEQ2	0	G	G	G	G	E	G	G	G	G	3	G	1	1	0	Y	F	0	G	G	0	G	G
				SEQ3	0	F	F	P	F	F	F	F	G	F	3	F	10	0	0	Y	P	0	F	F	0	F	F
				SEQ4	0	E	E	E	G	E	E	E	E	E	1	E	2	0	0	N	G	0	G	G	0	G	G
				SEQ5	0	G	G	G	G	E	G	G	G	G	2	F	2	0	0	Y	F	0	F	G	0	G	G
526	58	FORD	LTD	SEQ1	0	G	G	G	G	E	G	F	F	F	3	G	1	1	0	Y	P	0	F	F	0	F	F
				SEQ2	0	G	G	F	F	G	G	G	G	G	1	G	1	1	0	Y	P	1	F	F	0	F	F
				SEQ3	0	G	G	F	G	G	G	G	G	G	1	G	1	0	1	N	G	0	E	G	0	E	E
				SEQ4	0	G	G	G	G	G	G	G	G	G	2	G	1	1	0	N	F	0	G	G	0	F	G
				SEQ5	0	E	E	G	G	G	E	E	E	E	2	G	2	4	1	Y	F	0	U	F	0	P	F
537	56	CHEV	NOVA	SEQ1	5	U	P	F	-	P	U	P	F	F	2	F	2	1	2	Y	P	2	P	P	1	F	F
				SEQ2	0	F	G	F	-	G	G	F	F	G	2	G	2	0	1	Y	P	1	F	F	0	F	F
				SEQ3	0	G	G	G	-	G	G	G	F	F	2	G	1	2	0	N	G	1	F	G	0	G	G
				SEQ4	4	P	F	P	-	P	P	P	P	P	1	P	1	1	0	Y	U	1	G	P	0	G	F
				SEQ5	0	P	P	P	-	P.	P	P	P	P	1	P	3	1	1	Y	P	0	P	G	0	G	G
538	58	CHEV	MALI	SEQ1	0	E	E	E	E	E	E	E	E	E	2	G	1	0	0	N	F	1	F	F	0	G	F
				SEQ2	0	E	E	E	E	E	E	E	E	E	2	E	2	0	0	N	G	1	G	G	0	G	G
				SEQ3	2	P	P	F	F	F	F	F	F	F	1	P	2	0	0	N	G	0	G	G	0	G	G
				SEQ4	0	G	G	F	E	E	G	E	E	F	2	E	2	0	0	N	G	0	G	G	0	G	G
				SEQ5	0	G	E	G	G	G	G	G	G	G	4	G	1	0	0	Y	F	1	F	G	0	F	G
539	58	BUIC	STAW	SEQ1	0	G	G	G	G	E	G	G	G	G	2	G	6	1	0	Y	F	0	F	G	0	G	G
				SEQ3	0	E	E	G	G	G	E	E	E	E	2	G	7	0	0	Y	F	0	P	F	1	P	F
				SEQ4	0	E	E	G	G	G	E	E	E	E	2	G	3	0	0	Y	F	0	F	F	0	F	G
				SEQ5	0	F	F	F	F	F	P	P	P	P	1	G	1	0	0	Y	F	0	F	G	0	F	G

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19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX K - LISTING OF TIRE INSPECTION INFORMATION ON INDIVIDUAL VEHICLES

Legend

VEH. NO - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

TIRE SIZE - Tire size of dyno drive wheel (N/A: no tire size recorded)

FRONT WEAR LEFT - Tire wear of front left (1: no unusual wear; 2: inside tread worn; 3: outside tread worn; 4: center worn; 5: both sides worn; 6: inside cupped; 7: outside cupped; 8: center cupped)

FRONT WEAR RGHT - Tire wear of front right (1: no unusual wear; 2: inside tread worn; 3: outside tread worn; 4: center worn; 5: both sides worn; 6: inside cupped; 7: outside cupped; 8: center cupped)

TIRE PRESSURES

FRONT LEFT - Tire pressure in psi

FRONT RGHT - Tire pressure in psi

FRONT SPEC - Manufacturer's recommended tire pressure in psi

REAR LEFT - Tire pressure in psi

REAR RGHT - Tire pressure in psi

REAR SPEC - Manufacturer's recommended tire pressure in psi

APPENDIX K

LISTING OF TIRE INSPECTION INFORMATION ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	TIRE SIZE	FRONT WEAR LEFT	FRONT WEAR RGHT	TIRE PRESSURES FRONT LEFT	FRONT RGHT	FRONT SPEC	REAR LEFT	REAR RGHT	REAR SPEC
511	1975	PLYM	DUST	F78-14	1	1	25	25	32	23	23	32
512	1975	DODG	CHAR	GR78-15	1	1	25	25	30	25	25	30
513	1975	PLYM	STAW	HR78-14	1	1	27	28	22	28	25	32
524	1975	MERC	MONA	185-14	2	1	39	35	24	35	34	26
525	1975	FORD	CUST	H78-15	1	1	26	31	26	30	27	28
526	1975	FORD	LTD	HR78-15	1	1	26	31	26	28	30	28
537	1975	CHEV	NOVA	E78-14	4	5	23	23	24	23	19	28
538	1975	CHEV	MALI	GR78-15	3	3	32	31	28	18	34	28
539	1975	BUIC	STAW	HR78-15	3	3	20	22	26	28	22	32

APPENDIX L - LISTING OF COMPARATIVE MILEAGE DATA ON INDIVIDUALS VEHICLES

Legend

VEH. NO. - Vehicle number

MODL YEAR - Model year

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

EPA GUIDEBOOK CITY - Fuel economy estimates for city driving in miles per gallon per EPA gas mileage guide (NA: no estimate available)

EPA GUIDEBOOK HGWY - Fuel economy estimates for highway driving in miles per gallon per EPA gas mileage guide (NA: no estimate available)

ACTUAL TEST CITY - Fuel economy in miles per gallon per Federal Test Procedure

ACTUAL TEST HGWY - Fuel Economy in miles per gallon per Highway Fuel Economy Test if applicable

OWNER ESTIMATE CITY - Owner estimate of city driving fuel economy (0: don't know)

OWNER ESTIMATE HGWY - Owner estimate of highway driving fuel economy (0: don't know)

OWNER ESTIMATE COMB - Owner estimate of overall fuel economy (0: don't know)

APPENDIX L

LISTING OF COMPARATIVE MILEAGE DATA ON INDIVIDUAL VEHICLES

ST. LOUIS

VEH. NO.	MODL YEAR	MAKE	MODL	CID	EPA GUIDEBOOK CITY	EPA GUIDEBOOK HGWY	-ACTUAL TEST- CITY	-ACTUAL TEST- HGWY	-- OWNER ESTIMATE -- CITY	-- OWNER ESTIMATE -- HGWY	-- OWNER ESTIMATE -- COMB
511	1975	PLYM	DUST	225	18	23	17.8	27.0	16	20	18
512	1975	DODG	CHAR	360	13	22	13.5	21.2	14	16	15
513	1975	PLYM	STAW	318	12	17	13.2	19.0	0	0	15
524	1975	MERC	MONA	250	15	20	18.1	24.8	0	0	20
525	1975	FORD	CUST	400	10	14	9.4	12.2	11	15	13
526	1975	FORD	LTD	351	11	15	10.9	16.6	0	0	15
537	1975	CHEV	NOVA	250	16	21	16.5	23.3	0	0	17
538	1975	CHEV	MALI	350	13	18	13.0	19.8	0	0	0
539	1975	BUIC	STAW	350	12	16	11.0	15.9	0	0	14

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APPENDIX M - LISTING OF DISABLEMENT/MALADJUSTMENT OCCURANCES

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

IND SYS - Induction system

CRB SYS - Carburetor and fuel system

IGN SYS - Ignition system

EGR SYS - E.G.R. system

AIR PMP - Air pump system

PCV SYS - P.C.V. system

EXH SYS - Exhaust system

EVP CTL - Evaporative control system

INT ENG - Other emission related components

D/M - Did component pass or fail disablement and maladjustment inspection? (P: pass; F: fail; -: not applicable; ?: not known if equipped or no apparent malperformance)

ACT - Action taken (ADJ: adjust or reconnect, no parts damaged, altered, or missing; RPR: repair, item present but damaged or altered slightly; RPL: replace, item missing or severely damaged - replacement necessary)

APPENDIX M

LISTING OF DISABLEMENT / MALADJUSTMENT OCCURANCES

ST. LOUIS

CHRYSLER

VEH. NO.	YR	MAKE	MODL	IND SYS D/M	IND SYS ACT	CRB SYS D/M	CRB SYS ACT	IGN SYS D/M	IGN SYS ACT	EGR SYS D/M	EGR SYS ACT	AIR PMP D/M	AIR PMP ACT	PCV SYS D/M	PCV SYS ACT	EXH SYS D/M	EXH SYS ACT	EVP CTL D/M	EVP CTL ACT	INT ENG D/M	INT ENG ACT
511	75	PLYM	DUST	P		F		P		P		-		P		P		P		?	
512	75	DODG	CHAR	F	ADJ	F		F	ADJ	F	ADJ	-		P		P		P		-	
513	75	PLYM	STAW	P		F		F	ADJ	F	ADJ	-		P		P		P		?	

FORD

VEH. NO.	YR	MAKE	MODL	IND SYS D/M	IND SYS ACT	CRB SYS D/M	CRB SYS ACT	IGN SYS D/M	IGN SYS ACT	EGR SYS D/M	EGR SYS ACT	AIR PMP D/M	AIR PMP ACT	PCV SYS D/M	PCV SYS ACT	EXH SYS D/M	EXH SYS ACT	EVP CTL D/M	EVP CTL ACT	INT ENG D/M	INT ENG ACT
524	75	MERC	MONA	P		F	ADJ	P		P		P		P		P		P		?	
525	75	FORD	CUST	P		F	ADJ	F	ADJ	F	ADJ	F	RPL	P		P		P		?	
526	75	FORD	LTD	P		F		P		F	RPR	P		P		P		P		?	

GENERAL MOTORS

VEH. NO.	YR	MAKE	MODL	IND SYS D/M	IND SYS ACT	CRB SYS D/M	CRB SYS ACT	IGN SYS D/M	IGN SYS ACT	EGR SYS D/M	EGR SYS ACT	AIR PMP D/M	AIR PMP ACT	PCV SYS D/M	PCV SYS ACT	EXH SYS D/M	EXH SYS ACT	EVP CTL D/M	EVP CTL ACT	INT ENG D/M	INT ENG ACT
537	75	CHEV	NOVA	P		F		P		F	RPR	-		P		P		P		?	
538	75	CHEV	MALI	P		F	RPL	P		P		-		F	RPL	P		P		?	
539	75	BUIC	STAW	F	RPL	F	RPL	P		P		-		P		P		P		?	

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APPENDIX N - LISTING OF EMISSION COMPONENT FUNCTION CHECK - CHRYSLER

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

PC - P.C.V. (P: pass)

EC - Evaporative control system (P: pass)

HD - Heated air inlet diaphragm (P: pass; -: not applicable)

DR - Heated air inlet door (P: pass)

ES - Electrically assisted choke switch (P: pass; -: not applicable)

CH - Electrically assisted choke heater (P: pass)

CI - C.C.I.E. switch (P: pass; F: fail; -: not applicable)

CE - C.C.E.G.R. switch (P: pass)

DS - Idle enrichment delay solenoid (P: pass)

ID - Idle enrichment diaphragm (P: pass)

OS - O.S.A.C. valve (P: pass; -: not applicable; F: fail)

EV - E.G.R. valve (P: pass)

TD - E.G.R. time delay solenoid (P: pass; -: not applicable)

VA - Vacuum control amplifier (P: pass; -: not applicable)

TC - T.I.C. valve (F: fail; -: not applicable)

AP - Air pump (-: not applicable)

TS - Throttle stop solenoid (F: fail; -: not applicable)

CP - Catalyst protect system speed switch (-: not applicable)

DP - Dashpot (-: not applicable)

CK - Choke kickdown diaphragm (P: pass)

SP - Spark plugs and cables, cap and rotor (P: pass)

VU - Vacuum advance unit (P: pass)

O1 - Other (-: not applicable)

O2 - Other (-: not applicable)

APPENDIX N - LISTING OF EMISSION COMPONENT FUNCTION CHECK - FORD

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

EH - Exhaust heat control valve (P: pass; -: not applicable)

PC - P.C.V. system (P: pass)

EV - E.G.R. valve (P: pass; -: not applicable)

EP - E.G.R. P.V.S. (P: pass; -: not applicable)

HM - High speed modulator (P: pass; -: not applicable)

VV - Venturi vacuum amplifier (-: not applicable)

VR - Vacuum reservoir, vacuum reservoir check valve (-: not applicable)

TP - Thermactor air pump (P: pass; -: not applicable)

BV - By-pass valve (P: pass)

TV - Thermactor check valves (P: pass; -: not applicable)

VC - Vacuum diff. control (P: pass)

PE - Electric P.V.S. (P: pass; -: not applicable; F: fail)

SV - Solenoid vacuum valve (P: pass; -: not applicable)

FS - Floor pan thermal switch (-: not applicable)

FD - Fuel deceleration valve diaphragm (-: not applicable)

FT - Fuel deceleration valve time rate (-: not applicable)

F1 - Fuel decel transmission interlock (-: not applicable)

P1 - P.V.S. fuel decel interlock (-: not applicable)

SM - Speed modulated decel (-: not applicable)

SD - Spark delay valves (-: not applicable)

SS - Spark control system distributor P.V.S. (P: pass; -: not applicable)

CS - Cold start P.V.S. (P: pass; -: not applicable)

CV - Vacuum check valve (-: not applicable)

SR - Spark retard delay valve (-: not applicable)

DD - Distributor disphragm (P: pass; F: fail)

PT - Throttle positioning solenoid (P: pass; -: not applicable)

CE - Electric choke (P: pass)

CD - Choke pull-off diaphragm (P: pass)

AM - Air cleaner vacuum motor (P: pass)

AT - Air cleaner temperature control, duct valve (P: pass;
F: fail; -: not applicable)

CW - Cold weather modulator (-: not applicable)

CA - Cold temp. actuated vacuum system (P: pass; -: not applicable)

AD - Air cleaner delay valve (-: not applicable; F: fail;
?: not known if equipped or no apparent malperformance)

SP - Spark plugs and wires (P: pass; F: fail)

EB - E.G.R. back pressure transducer (P: pass; -: not applicable)

OT - Other (-: not applicable)

APPENDIX N - LISTING OF EMISSION COMPONENT FUNCTION CHECK - GENERAL MOTORS

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

PC - P.C.V. (P: pass)

HA - Heated air inlet (P: pass)

EF - E.F.E. (P: pass)

ET - E.F.E. TVV (P: pass)

FC - E.F.E. check valve (P: pass; -: not applicable)

EV - E.G.R. valve (P: pass; F: fail)

TE - E.G.R. TCV (P: pass; -: not applicable)

SC - E.G.R. snap disc control valve (-: not applicable)

EB - E.G.R. back pressure transducer (-: not applicable)

VE - E.G.R. TVV (P: pass)

AR - Air injection reactor (-: not applicable)

FA - Full vacuum advance system (P: pass; -: not applicable)

PA - Ported vacuum advance system (P: pass; -: not applicable)

DD - Distributor advance diaphragm (P: pass)

DV - Vacuum spark delay valve or restrictor (-: not applicable)

AV - Vacuum advance TVV (-: not applicable)

AS - Vacuum advance TVS (P: pass; -: not applicable)

VM - Vacuum advance modulator valve (-: not applicable)

IS - Idle stop solenoid (P: pass; -: not applicable)

VB - Vacuum break, primary (P: pass; F: fail)

VS - Vacuum break, secondary (P: pass; F: fail; -: not applicable)

CE - Electric choke (-: not applicable)

SP - Spark plugs, wires (P: pass)

O1 - Other (-: not applicable)

APPENDIX N

LISTING OF EMMISSION COMPONENT FUNCTION CHECK

ST. LOUIS

CHRYSLER

VEH. NO.	YR	MAKE	MODL	PC	EC	HD	DR	ES	CH	CI	CE	DS	ID	OS	EV	TD	VA	TC	AP	TS	CP	DP	CK	SP	VU	O1	O2
511	75	PLYM	DUST	P	P	P	P	P	P	-	P	P	P	-	P	P	P	-	-	F	-	-	P	P	P	-	-
512	75	DODG	CHAR	P	P	-	P	P	P	F	P	P	P	P	P	-	P	-	-	F	-	-	P	P	P	-	-
513	75	PLYM	STAW	P	P	P	P	-	P	P	P	P	P	P	P	P	-	F	-	-	-	-	P	P	P	-	-

FORD

VEH. NO.	YR	MAKE	MODL	EH	PC	EV	EP	HM	VV	VR	TP	BV	TV	VC	PE	SV	FS	FD	FT	FI	PI
524	75	MERC	MONA	-	P	P	P	P	-	-	P	P	P	P	P	P	-	-	-	-	-
525	75	FORD	CUST	P	P	P	P	-	-	-	F	P	-	P	-	P	-	-	-	-	-
526	75	FORD	LTD	P	P	P	-	-	-	-	P	P	P	P	F	-	-	-	-	-	-

VEH. NO.	YR	MAKE	MODL	SM	SD	SS	CS	CV	SR	DD	PT	CE	CD	AM	AT	CW	CA	AD	SP	EB	O1
524	75	MERC	MONA	-	-	-	-	-	-	P	-	P	P	P	-	-	P	?	P	-	-
525	75	FORD	CUST	-	-	P	-	-	-	F	P	P	P	P	P	-	-	-	F	-	-
526	75	FORD	LTD	-	-	P	P	-	-	P	P	P	P	P	F	-	-	F	P	P	-

GENERAL MOTORS

VEH. NO.	YR	MAKE	MODL	PC	HA	EF	ET	FC	EV	TE	SC	EB	VE	AR	FA	PA	DD	DV	AV	AS	VM	IS	VB	VS	CE	SP	O1
537	75	CHEV	NOVA	P	P	P	P	P	P	-	-	-	P	-	P	-	P	-	-	-	-	P	P	P	-	P	-
538	75	CHEV	MALI	P	P	P	P	-	F	-	-	-	P	-	P	-	P	-	-	-	-	-	F	-	-	P	-
539	75	BUIC	STAW	P	P	P	P	-	P	P	-	-	P	-	-	P	P	-	-	P	-	-	P	F	-	P	-

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

APPENDIX O - LISTING OF IDLE INSPECTION AND ADJUSTMENTS - CHRYSLER

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

CYL - Number of cylinders

IQ - Idle quality before adjustment (E: excellent; F: fair; P: poor)

IRPMM - Curb idle RPM measured before adjustment

IRPMS - Curb idle RPM specified by manufacturer

IRPMA - Curb idle adjustment required at this time? (Y: yes; N: no)

EISM - Enriched idle speed in RPM (Measured)

EISS - Enriched idle speed in RPM (Specification)

IMA - Idle mixture adjustment required at this time? (Y: yes; N: no)

N4TR - Number of 1/4 turns of mixture screws to achieve a smooth idle at the specified curb idle speed (Right barrel)*

N4TL - Number of 1/4 turns of mixture screws to achieve a smooth idle at the specified curb idle speed (Left barrel)*

LC - Was the adjustment within the range allowed by the limiter caps? (Y: yes; N: no; M: caps missing or not functional; NA: not applicable)

FIQ - Final idle quality as compared to quality before adjustment (MB: much better; SB: slightly better; ND: no difference; SW: slightly worse; MW: much worse)

*In the case of single barrel carburetors, the number of 1/4 turns is listed under N4TL.

APPENDIX O - LISTING OF IDLE INSPECTION AND ADJUSTMENTS - FORD

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

CYL - Number of cylinders

IQ - Idle quality before adjustment (E: excellent; F: fair; P: poor)

IRPMM - Idle RPM measured before adjustment

IRPMS - Idle RPM specified by manufacturer

IRPMA - Idle RPM measured after adjustment

ARSI - Allowable range of idle speed increase with propane enrichment in RPM

MISI - Measured idle speed increase with propane enrichment before adjustment in RPM

FIS - Final idle speed in RPM

R RANGE - Specified reset range for idle speed increase in RPM

FSI - Final idle speed increase in RPM

N4T - Number of 1/4 turns of mixture screws to achieve idle CO setting

LC - Was adjustment within range allowed by limiter caps (Y: yes; N: no; M: caps missing or not functional; NA: not applicable)

FIQ - Final idle quality as compared to quality before adjustment (MB: much better; SB: slightly better; ND: no noticeable difference; SW: slightly worse; MW: much worse)

APPENDIX O - LISTING OF IDLE INSPECTION AND ADJUSTMENTS - GENERAL MOTORS

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

CID - Engine displacement in cubic inches

CYL - Number of cylinders

IQ - Idle quality before adjustment (E: excellent; F: fair; P: poor)

IRPMM - Idle RPM measured before adjustment

N4TR - Number of 1/4 turns to lightly seat right idle mixture screw

N4TL - Number of 1/4 turns to lightly seat left idle mixture screw

LDIS - Specified "before lean drop idle" speed

FIS - Specified final idle speed

N4T - Number of 1/4 turns of each screw to achieve lean drop

N4TFR - Final number of 1/4 turns of right idle mixture screw from the lightly seated position to achieve the specified final idle speed

N4TFL - Final number of 1/4 turns of left idle mixture screw from the lightly seated position to achieve the specified final idle speed

FIQ - Final idle quality as compared to quality before adjustment (MB: much better; SB: slightly better; ND: no noticeable difference; SW: slightly worse; MW: much worse)

APPENDIX O

LISTING OF IDLE INSPECTION AND ADJUSTMENTS

ST. LOUIS

CHRYSLER

VEH. NO.	YR	MAKE	MODL	CID	CYL	IQ	IRPMM	IRPMS	IRPMA	EISM	EISS	IMA	N4TL	N4TR	LC	FIQ
511	75	PLYM	DUST	225	6	E	750	750	N	0	0	N	0	0	NA	ND
512	75	DODG	CHAR	360	8	E	680	750	N	0	0	N	0	0	NA	ND
513	75	PLYM	STAW	318	8	E	730	750	N	0	0	N	0	0	NA	ND

FORD

VEH. NO.	YR	MAKE	MODL	CID	CYL	IQ	IRPMM	IRPMS	IRPMA	ARSI	ISI	FIS	R-RANGE	FSI	N4T	LC	FIQ
524	75	MERC	MONA	250	6	F	760	850	850	10 -90	40	850	0 -0	0	0	NA	ND
525	75	FORD	CUST	400	8	F	720	700	720	30 -50	40	720	0 -0	0	0	NA	ND
526	75	FORD	LTD	351	8	E	660	700	660	0 -0	28	660	0 -0	0	0	NA	ND

GENERAL MOTORS

VEH. NO.	YR	MAKE	MODL	CID	CYL	IQ	IRPMM	N4TR	N4TL	LDIS	FIS	N4T	N4TFR	N4TFL	FIQ
537	75	CHEV	NOVA	250	6	P	600	0	11	580	550	5	0	5	SB
538	75	CHEV	MALI	350	8	F	500	16	20	650	600	2	9	9	ND
539	75	BUIC	STAW	350	8	F	580	12	12	680	600	12	6	6	SW

APPENDIX P - LISTING OF ONE YEAR OR 15,000 MILE REQUIRED MAINTENANCE - CHRYSLER

Legend

EOF - Replace engine oil and filter

CLS - Check cooling system

EGR - Check EGR system

IGN - Check ignition cables, cap and rotor

PCV - Check PCV system and air filter

SPL - Replace spark plugs (leaded fuel)

AJT - Adjust tappets (six cylinder)

H&G - Inspect hoses and grommets

CFL - Replace cannister filter

CCA - Check and lube carburetor choke shaft

FIC - Check and lube fast idle cam pivot

ISM - Adjust idle speed and mixture

OTH - Other _____

I - Inspection: Did maintenance operation pass or fail inspection? (P: pass; F: fail; -: not applicable)

A - Action Taken: (0: no action; 1: adjust or reconnect, no parts damaged, alter or missing; 2: repair, item present but damaged or altered slightly; 3: replace, item missing or severely damaged - replacement necessary)

APPENDIX P - LISTING OF ONE YEAR OR 15,000 MILE
REQUIRED MAINTENANCE - FORD

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

CEO - Change engine oil

ROF - Replace oil filter

TIB - Torque intake manifold bolts, 1975 only

ECV - Lube/check exhaust control valve

CLS - Check coolant

CBT - Check belt tensions

ITS - Inspect thermactor system

FDV - Check/adjust fuel decel valve

IGN - Check ignition system with scope

RSP - Replace spark plugs, 1975 only

SPW - Inspect/test spark plug wires

CIT - Check initial timing

SCD - Check spark control/delay system

IFM - Check idle fuel mixture

FIS - Check fast idle speed

CIS - Check curb idle speed

CHS - Check choke system

ACT - Check air cleaner temperature control/delay valve

RFF - Replace fuel filter, 1975 only

AVC - Adjust valve clearance, 2.8 liter only

BSB - Check/torque all belt securing bolts, 1975 four cylinder only

DCR - Inspect distributor cap-rotor

AFE - Inspect air filter element

PCV - Inspect PCV hoses

TSS - Check throttle solenoid "off" speed

OTH - Other _____

I - Inspection: Did maintenance operation pass or fail inspection? (P: pass; F: fail; -: not applicable)

A - Action Taken: (0: no action; 1: adjust or reconnect, no parts damaged, altered or missing; 2: repair, item present but damaged or altered slightly; 3: replace, item missing or severely damaged - replacement necessary)

APPENDIX P - LISTING OF ONE YEAR OR 22,500 MILE REQUIRED MAINTENANCE - GENERAL MOTORS

Legend

VEH - Vehicle number

MAKE - Vehicle make

MODL - Vehicle model

CEO - Change engine oil

COF - Change oil filter

CCS - Check cooling system

CES - Check exhaust system

IDB - Inspect drive belts

CTL - Check throttle linkage

CAC - Check air cleaner filter elements

ICC - Carburetor and choke inspection

AIS - Check and adjust idle speed

EFE - Check E.F.E. valve

CMB - Torque carburetor mounting bolts

VAS - Check vacuum advance hoses

RFF - Replace fuel filter

PCV - Check P.C.V. system

CIT - Check ignition timing

AVL - Check and adjust mechanical valve lifters

VDV - Check vacuum delay and separator valve

ISP - Inspect and clean spark plug wires, replace spark plugs

OTH - Other _____

I - Inspection: Did maintenance operation pass or fail inspection? (P: pass; F: fail; -: not applicable)

A - Action Taken: (0: no action; 1: adjust or reconnect, no parts damaged, altered or missing; 2: repair, item present but damaged or altered slightly; 3: replace, item missing or severely damaged - replacement necessary

APPENDIX P

LISTING OF REQUIRED MAINTENANCE

ST. LOUIS

CHRYSLER

(ONE YEAR OR 15,000 MILES)

VEH. NO.	YR	MAKE	MODL	EOF I	EOF A	CLS I	CLS A	EGR I	EGR A	IGN I	IGN A	PCV I	PCV A	SPL I	SPL A	AJT I	AJT A	HZG I	HZG A	CFL I	CFL A	CCA I	CCA A	FIC I	FIC A	ISM I	ISM A	OTH I	OTH A
511	75	PLYM	DUST	P	3	P	1	P	0	P	3	P	3	P	3	F	1	P	0	P	3	P	2	P	2	F	1	P	3
512	75	DODG	CHAR	P	3	P	1	P	0	P	0	P	3	P	3	-	0	P	0	P	3	P	1	P	1	P	1	P	3
513	75	PLYM	STAW	P	3	P	1	P	0	F	3	P	3	P	3	-	0	P	0	F	3	P	1	P	1	F	1	P	3

FORD

(ONE YEAR OR 15,000 MILES)

VEH. NO.	YR	MAKE	MODL	CEO I	CEO A	ROF I	ROF A	TIB I	TIB A	ECV I	ECV A	CLS I	CLS A	CBT I	CBT A	ITS I	ITS A	FDV I	FDV A	IGN I	IGN A	RSP I	RSP A	SPW I	SPW A	CIT I	CIT A	SCD I	SCD A
524	75	MERC	MONA	P	3	P	3	P	0	P	0	P	0	P	0	P	0	-	0	P	0	P	3	P	0	P	0	-	0
525	75	FORD	CUST	P	3	P	3	P	1	P	1	P	0	P	0	P	0	-	0	P	0	P	3	P	0	P	1	P	0
526	75	FORD	LTD	P	3	P	3	P	1	P	1	P	0	P	0	P	0	-	0	P	0	P	3	P	0	P	1	P	0

VEH. NO.	YR	MAKE	MODL	IFM I	IFM A	FIS I	FIS A	CIS I	CIS A	CHS I	CHS A	ACT I	ACT A	RFF I	RFF A	AVC I	AVC A	BSB I	BSB A	DCR I	DCR A	AFE I	AFE A	PCV I	PCV A	TSS I	TSS A	OTH I	OTH A
524	75	MERC	MONA	P	0	P	0	P	0	P	0	P	0	P	3	-	0	P	0	P	0	P	3	P	0	P	0	P	3
525	75	FORD	CUST	P	0	P	0	P	0	P	0	P	0	P	3	-	0	P	0	F	3	P	3	P	0	P	0	P	3
526	75	FORD	LTD	P	0	P	0	P	0	P	0	P	0	P	3	-	0	P	0	P	0	P	3	P	0	P	0	P	3

GENERAL MOTORS

(ONE YEAR OR 22,500 MILES)

VEH. NO.	YR	MAKE	MODL	CEO I	CEO A	COF I	COF A	CCS I	CCS A	CES I	CES A	IDB I	IDB A	CTL I	CTL A	CAC I	CAC A	ICC I	ICC A	AIS I	AIS A	EFE I	EFE A	CMB I	CMB A	VAS I	VAS A	RFF I	RFF A	PCV I	PCV A	CIT I	CIT A	AVL I	AVL A	VDV I	VDV A	ISP I	ISP A	OTH I	OTH A
537	75	CHEV	NOVA	P	3	P	3	P	3	P	0	P	0	P	0	P	3	F	3	P	0	P	0	P	0	P	0	P	3	P	3	P	0	?	0	-	0	P	3	P	3
538	75	CHEV	MALI	P	3	P	3	P	3	P	3	P	3	P	3	P	3	F	2	F	2	P	0	P	2	P	0	P	3	P	3	F	2	-	0	-	0	P	3	P	3
539	75	BUIC	STAW	P	3	P	3	P	3	P	3	P	3	P	3	P	3	F	2	F	2	P	0	P	2	P	0	P	3	P	3	F	2	-	0	-	0	P	3	P	3

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APPENDIX Q - SUMMARY OF VEHICLE RESTORATIVE MAINTENANCE COSTS ON INDIVIDUAL VEHICLES

Legend

VEH. NO. - Vehicle Number

MODL - Vehicle model

DISABLEMENT/MALADJUST - Lists cost associated with tampering inspection and correction

EMISSION COMPONENTS - Lists cost associated with emission component function check and correction

IDLE SET - Listing of cost associated with idle CO and RPM inspection and adjustment

MAJOR TUNE-UP - Listing of costs associated with one year required maintenance

TOTAL LABOR - Cost of labor for above inspections, adjustments, and repairs at $15.00 per hour

TOTAL PARTS - Cost of parts used in above repairs

TOTAL COST - Sum of TOTAL LABOR and TOTAL PARTS

APPENDIX Q

SUMMARY OF VEHICLE RESTORATIVE MAINTENANCE COSTS

ON INDIVIDUAL VEHICLES

ST. LOUIS

CHRYSLER

VEH. NO.	MODL	DISABLEMENT/MALADJUST INSP. LABOR	DISABLEMENT/MALADJUST CORRECTION LABOR	DISABLEMENT/MALADJUST CORRECTION PARTS	EMMISSION COMPONENTS INSP. LABOR	EMMISSION COMPONENTS CORRECTION LABOR	EMMISSION COMPONENTS CORRECTION PARTS	IDLE SET LABOR	MAJOR TUNE-UP LABOR	MAJOR TUNE-UP PARTS	TOTAL LABOR	TOTAL PARTS	TOTAL COST
511	DUST	22.50	0.00	43.04	30.00	7.50	0.00	0.00	82.50	40.05	142.50	83.09	225.59
512	CHAR	15.00	15.00	67.74	22.50	11.25	27.44	0.00	22.50	40.30	86.25	135.48	221.73
513	STAW	7.50	7.50	50.75	30.00	15.00	9.15	0.00	45.00	41.60	105.00	101.50	206.50

FORD

VEH. NO.	MODL	DISABLEMENT/MALADJUST INSP. LABOR	DISABLEMENT/MALADJUST CORRECTION LABOR	DISABLEMENT/MALADJUST CORRECTION PARTS	EMMISSION COMPONENTS INSP. LABOR	EMMISSION COMPONENTS CORRECTION LABOR	EMMISSION COMPONENTS CORRECTION PARTS	IDLE SET LABOR	MAJOR TUNE-UP LABOR	MAJOR TUNE-UP PARTS	TOTAL LABOR	TOTAL PARTS	TOTAL COST
524	MONA	15.00	1.50	27.65	120.00	0.00	0.00	4.50	52.50	27.65	193.50	55.30	248.80
525	CUST	15.00	1.50	208.07	22.50	22.50	161.76	3.00	45.00	41.55	109.50	411.38	520.88
526	LTD	15.00	7.50	44.55	15.00	11.25	14.40	3.00	33.00	30.15	84.75	89.10	173.85

GENERAL MOTORS

VEH. NO.	MODL	DISABLEMENT/MALADJUST INSP. LABOR	DISABLEMENT/MALADJUST CORRECTION LABOR	DISABLEMENT/MALADJUST CORRECTION PARTS	EMMISSION COMPONENTS INSP. LABOR	EMMISSION COMPONENTS CORRECTION LABOR	EMMISSION COMPONENTS CORRECTION PARTS	IDLE SET LABOR	MAJOR TUNE-UP LABOR	MAJOR TUNE-UP PARTS	TOTAL LABOR	TOTAL PARTS	TOTAL COST
537	NOVA	11.25	1.50	53.32	7.50	0.00	0.00	7.50	55.50	53.32	83.25	106.64	189.89
538	MALI	27.00	27.00	110.59	22.50	7.50	31.20	15.00	292.50	77.85	391.50	219.64	611.14
539	STAW	22.50	7.50	97.33	22.50	3.75	10.05	9.00	0.00	0.00	65.25	107.38	172.63

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